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COVER: Pasadena, Texas, vehicular tunnel showing north ramp, tube entrance and ventilation building. Note article by W. F. Palmer.

Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

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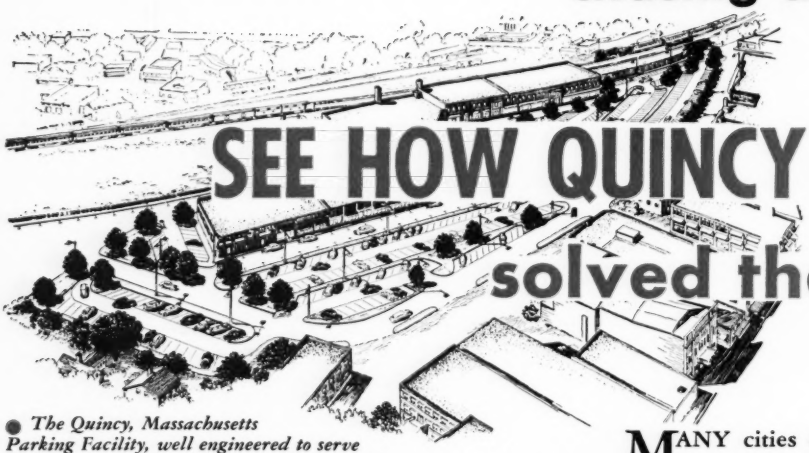
Is parking Congestion chasing away Business?



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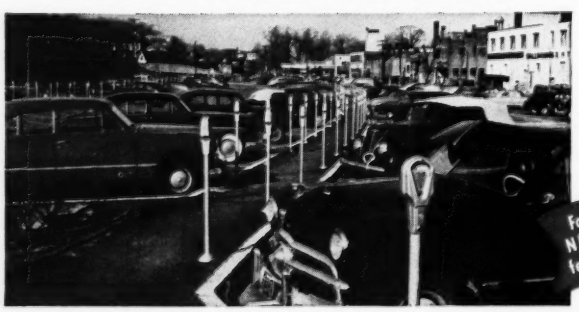
● *Grading under way, an initial step to provide sufficient parking area, conveniently arranged for maximum utility.*

● *This view shows how area was laid out to achieve interesting and attractive appearance as well as efficient use of space.*



● *One of the walkways, an important safety feature, showing installation of Dual Parking Meters which serve the entire facility.*

MANY cities are facing a serious new parking problem. Shoppers are by-passing business areas where it is hard, or impossible, to find parking space. Merchants lose business. Property owners lose tenants. And municipalities foresee deteriorating business sections.

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For the NEWEST features... LOOK TO DUAL The ORIGINAL Parking Meter

...YOUR BEST ANSWER TO EVERY PARKING PROBLEM

Frankly Speaking

THERE are some traffic engineers who are constantly urging higher standards for our profession that don't use these standards in their every-day practice of traffic engineering.

That's fighting talk, but it's based on fact not opinion—and the facts have been admitted openly in discussion dealing with the ITE Awards based on the Annual Inventory of Traffic Safety Activities.

All of us know by now that the Inventory is an annual stock-taking of traffic control and accident prevention programs for states and cities. Our leaders have been active in promoting the cooperative professional approach embodied in the engineering work of the President's Highway Safety Conference, recognizing the need for a statement of objectives, and periodic review and appraisal.

Some engineers criticize the questionnaire appraisal of traffic engineering as confusing or as offering little basis of comparison between states and cities.

In too many cases these critics admitted that they had filled out their reports in a few minutes on the date of the deadline. How could they have come up with an honest appraisal of their own efforts or that of their departments in such a "brush off" check list?

In the vast majority of cases, traffic engineers have found the Inventory a useful tool. In some cities it has been used successfully to secure public recognition of the vital contribution of traffic engineering and has helped get adequate budgets for traffic control and accident prevention programs. The record is filled with cases in which the Inventory has been useful in improving departmental procedures, sparking interest and enthusiasm which has produced an alert departmental personnel, or as an annual report to the city council, the general assembly or the chief executive.

Every successful business takes inventory regularly and annually. An intelligent audit of any business or professional endeavor is needed prior to the compilation of a profit and loss statement. Are we traffic engineers operating under any other dispensation? Certainly we have found in the laboratory of actual experience some results which have disproved all our theory. Yet none of these things would have been accomplished had we failed in following the logical—the engineering—approach.

There should be competition between traffic engineering departments to bring out the best that is in us.

Competition is the life of our business and professional world. The Awards of the Institute of Traffic Engineers should stimulate a more extensive competition that will save lives, move traffic expeditiously and make our profession vital to the general welfare of all of the people. Is that bad?

The full exploitation of the Inventory means greater competition for the Institute Engineering Awards. The Inventory has done much to promote the traffic engineering profession and can do more, if we will but use it.

Standards for judging engineering progress are the business of traffic engineers. Criticism of present standards is a challenge to our profession to develop more equitable ones. Mere criticism is not enough. Cooperation is needed in producing the right answers. So, let us assume our responsibilities.

Harry Porter Jr.

Director

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He's always known the *most* about the scientific subject of reflectivity and has done the *most* in applying it to center-lines and safety signs for the protection of human life.

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Traffic Engineering And Highway Administration

By Charles M. Ziegler
State Highway Commissioner, Lansing, Michigan

HIGHWAY administration has many essential functions, but only one basic responsibility. It must plan its system, design the pavement and structures, supervise their construction, maintain the existing plant, and handle the fiscal operations which make these activities possible. But the end purpose of all these functions is to provide safe and efficient service to traffic—to create and operate an effective and dependable transportation utility.

In providing this safe and efficient service, an administrator would have a good right arm should his organization include a strong traffic engineering division, adequately staffed and developed in proportion to the agency's highway and traffic responsibilities. I believe every highway agency should have such a traffic engineering division to assist in the performance of many of the administrator's important duties.

The number and complexity of the duties required to produce adequate highway service are so great that sometimes the administrator finds it difficult to keep his sights trained on the main objectives. The administrator can use the kind of a traffic engineering division that I am thinking about, not only for the performance of its specialized traffic control duties, but as a source of information regarding the basic factors which affect his other functions.

A traffic division that is capable of delivering these services to the administrator must be carefully selected and organized. Its engineering personnel must be experienced and skillful in analyzing traffic problems and in the techniques of traffic control. They must be painstaking in the collection of traffic data and thoroughly grounded in what these data mean in terms of highway requirements and operation. And they must have knowledge of the activities and enterprises that traffic serves so that they will be practical and helpful in selecting their measures of traffic regulation.

Having been in the business of highway administration for quite a number of years, I have had opportunity to watch the gradual development of the talents and usefulness of the traffic engineering profession. I remember about its early struggle for what it considered adequate recognition. Frankly, I think some of those troubles were due, in some cases at least, to being more concerned with establishing traffic engineering as a profession than with developing the solid basis of facts and principles which professional standing requires.

However, that was a long time ago and during the past fifteen years traffic engineering has come into its own. As the result of the study, hard work, and solid accomplishment of hundreds of men in all parts of the country, traffic engineering has gained the general recognition of highway administrators and the public as a highly useful profession.

Accident Prevention the Popular Concept

From the popular viewpoint, the work in accident prevention probably is the best known and appreciated of the traffic engineer's activities. It also is of great value to the highway official, both because of its objective of saving lives, and because of its effect on his relations with the general public.

As you well know, when there are highway accidents, people attach some degree of responsibility to the administrator of the system on which they occur. This is a healthy condition, for even though a man lacked humanitarian interest in accident prevention, he would still make an effort to avoid this public blame.

The public and the highway administrator both look to the traffic engineer to devise means of protection against highway hazards. Fortunately for the safety of motorists and for the efficiency of highway traffic, the engineers have been able to take measures which helped to improve conditions. In spite of mounting accident totals, the accident rate shows a steady and consistent decline. At a time when traffic volumes are at their highest and show every sign of continuing their upward trends, that is something to be very thankful for.

The Problem of Congestion

Next in importance to accident prevention, is the problem of congestion on our over-loaded streets and highways. It would be difficult to over-state the seriousness of the outlook in this field. During the last few years the costs of new construction have increased even faster than traffic, but there has been no compensating rise in the income of highway agencies. So, since we cannot hope to have construction keep pace with needs, without additional income, here again we have frequently had to call on traffic engineering for aid.

There is this bright side to that picture. Because of the adverse conditions that I have cited, the traffic engineers and the highway administrators as well, have been forced to give the most serious study to ways and means of making existing roadways carry the load. Some old methods of bettering the operation of roads and streets have been improved, and a few new methods have been found. This does not mean that congestion is licked, but at least traffic has been kept moving though sometimes under heavy handicaps.

This experience will undoubtedly have some lasting effect on future highway policy. The beneficial results that are being obtained by the use of directional streets and in dealing with parking requirements, are facts that will be taken into account in considering future needs. In some cases they may suggest practical alternatives to the almost prohibitive expenditures required for expressway construction.

Michigan's Traffic Engineering Program

The Michigan State Highway Department believes in traffic engineering and is consistently using and supporting it. Within the past year we have completed the setting up of a signing program of unprecedented scope. It provides for the complete modernization of our sign plant on the entire rural and urban trunkline system.

This would be done mainly by installing new equipment in place of the worn and obsolete signs that are now doing duty. However, wherever existing signs could be refinished to standard design and new condition, that would be done.

The program calls for accomplishment of this undertaking as a Federal Aid project—the first such project in the country—and for its completion in the brief space of two years. As you possibly have heard, this program is just now suffering from Administrative—not highway administrative—complications and delays.

In its use of signals and pavement markings as well as of signs, the Department practice follows the national standards closely. Nevertheless, we have not hesitated to develop and retain designs and installation usages which fit Michigan conditions. In the course of the negotiations for our Federal Aid signing project, several of these designs that differ from the national standards receive the sanction and approval of the Bureau of Public Roads.

I don't know of any better evidence of the Department's belief in the value of traffic engineering than our established procedure with regard to construction plans. At a certain stage in their preparation, all such plans are sent to the Planning and Traffic Division for examination by the traffic design engineers. It is their duty to check them for adequacy to accommodate all expected traffic movements and conditions.

When one considers that the end purpose of all of our highway operations is to provide safe and efficient service for traffic, this is clearly a necessary and logical procedure. In the last analysis, questions directly affecting the quality of the service to traffic should be decided on the basis of the actual demonstrated needs of traffic. Then, the very best obtainable designing skill and construction judgment should be applied to the job of producing the facilities suited for that purpose.

This traffic design inspection function is a very responsible one. In these days of high construction costs when no highway agency can afford to make mistakes, it is one of the most important services that the traffic engineer can render to highway administration. It requires that the traffic engineer shall know his traffic in every detail. It requires that he have the ability to see the meaning of road and bridge plans in terms of their future usage by and service to traffic. Such knowledge and ability can come only from thorough training and long and sound experience.

The Highway Administrator's Public Contact

Better training and accumulating experience are what traffic engineers have been getting more of every year. That is what has been maturing their work into a calling of true technical and professional status. As a result of this maturing process, the average traffic engineer has become surer of his ground and of greater value to the agencies and the public for whom he works. At the same time it has given him a broader view and a better knowledge of the private and public activities with which his job is constantly involved.

Highway administrators have noted and welcomed these developments, for they have greatly extended the traffic engineers' field of usefulness. There is probably no other classification of highway personnel that is so often called upon to represent the administrator in contacts with the public. It is the traffic engineer who actually works with state and local enforcement and public officials in establishing speed regulations and other controls. He is the one who negotiates with the owners of roadside property to abate parking and driveway abuses or to control the placement of stands or signs in the right-of-way.

In many of these transactions it is necessary to obtain the assent of interested parties to measures which restrict their activities. It is of course necessary that the men who represent the administrator in these negotiations shall have some gift of diplomacy, but diplomacy by itself is not enough.

They should have, in addition, a good understanding of the business and problems of the men they are dealing with. In that way they can select and design measures to obtain the desired results with as little interference with legitimate operations as possible. By so doing they can usually secure some degree of cooperation where there would otherwise be bitter antagonism. This continuing, on-the-job education regarding the conditions surrounding his own job, is the sure sign of the most able type of traffic engineer.

There is another quality that even the best trained and most experienced traffic engineer ought to take pains to cultivate. That is the quality of constant alertness to the roadway, roadside, and traffic factors affecting traffic operation.

I am not a traffic engineer except in the sense that I am traffic minded. But in my own travels about the state, I sometimes spot a curve or other condition that has elements of hazard for traffic but which has escaped the notice of the district traffic engineer. That is because he has come to know it so well that it is no longer a hazard.

This is not a criticism aimed particularly at traffic engineers. All of us, whether we are highway engineers, maintenance engineers, or highway administrators, are very apt to lose our discriminating judgment regarding the things we see or experience every day. It is a common failing, but one which the traffic engineer should especially guard against.

The traffic engineering profession started, as I think we now will all admit, with a few men of great personal energy, considerable foresight regarding developing traffic conditions, but very little actual knowledge and experience. Through patient study, experiment, and operating practice, traffic engineers have now become hard-working and productive members of the highway engineering team. As a highway administrator whose experience extends over the whole period of this growth and development, I can state that highway administration sets a high value on the traffic engineers' abilities and services.

South's First Toll-Free Tunnel

By Wayne F. Palmer
President, Palmer & Baker, Inc., Consulting Engineers, Mobile, Alabama

WORK on the Pasadena, Texas, tunnel under the Houston Ship Channel is progressing satisfactorily and the official opening is scheduled this month. The tunnel is located 10 miles southeast of Houston, Texas. It is the second such subaqueous tunnel in the South, the first having been completed in 1941 at Mobile, Alabama. The Pasadena tunnel, unlike that of Mobile's Bankhead Tunnel, will be toll-free. It is being financed by Harris County under improvement bond issues of $8,100,000.

The tunnel measures 3,791 feet in length between grade points with 6% grades, and provides a clear channel depth of 45 feet at the Houston Ship Channel. It provides for traffic lanes, police walk-ways, air ducts and power and telephone conduits. The south and open ramp approach section is 530 ft. long with a concrete arch section 718 ft. long. The north approach ramp is 325 ft. long with a 718 ft. long concrete arch section. The tube section across the waterway is 1500 ft. long.

Trench Method Used

In building the tunnel the Trench Method was used. The land sections and the open ramps were constructed in the dry, in deep, open cuts. The waterway section consists of four prefabricated steel tubes, each 32 ft. inside diameter and 375 ft. long, lined with a 24-inch concrete strength ring. The inner circular steel shell is enclosed by outer octagonal steel form plates. Tremie concrete from 18 to 34 inches thick was poured between the inner circular shell and outer octagonal form and sunk in a dredged trench, aligned and joined together, and to the shore construction by watertight connections.

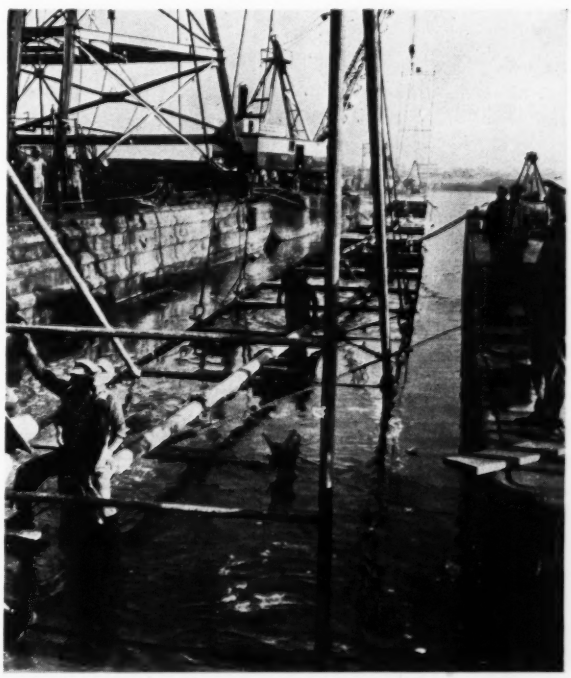
The four steel tubes of the waterway section were fabricated in the yard of the Ingalls Shipbuilding Company, at Pascagoula, Mississippi. Ballasted for stability, they were towed 400 miles through the Gulf of Mexico, Inland Waterway and the Ship Channel to the Clinton Docks at Galena, Texas, about two miles from the site of the tunnel. Here, Merritt, Chapman and Scott completed each section afloat. The inner strength ring was installed, complete with roadway, walkway, ventilation duct and conduits, and as much of the external concrete shell as was possible without exceeding the limit of draft permitted in towing the sections to the tunnel site without grounding in the Ship Channel.

Upon arrival at the tunnel site, the tubes were sunk accurately into position in a pre-dredged trench, by adding enough tremie concrete to give them a negative buoyancy of about twenty tons. Supported and controlled during sinking by two floating cranes, each was landed on two steel pile bents previously constructed in the bottom of the trench. Eighty tons more of concrete were loaded, and they were aligned and secured to the adjacent tube by positioning pins and steamboat ratchets provided for the purpose. The joints consisted of circular knife edge on one tube which was drawn into gasketed circular groove on the other, forming a watertight seal. A heavy blanket of tremie concrete was poured outside these joint sections, sand fill jetted under and around the tube, the temporary supports cut, and the concreting of the outer shell completed by the tremie method. Tremie concrete was placed by pumping ready-mixed concrete through a 7 inch pumpcrete machine and pipe line, discharging through elephant trunks suspended from a floating derrick.

These operations having been completed, the temporary watertight bulkheads at either end of the tube were successively removed, the joints made permanently watertight by a channel ring welded across the gasketed joint, and the interior tiling, paving, lighting and other accessories completed.

Tunnel Approaches

The Shore sections of the tunnel were built in open cuts with natural banks, except where the proximity of adjacent buildings necessitated provision of sheet piling for protec-



Tube section of Pasadena, Texas, tunnel supported and controlled during sinking by two floating cranes. Each section was landed on steel pile bents previously constructed in bottom of trench.

The north Shore section of Pasadena, Texas, tunnel built in deep open cuts with natural banks.

tion. A 4-inch sand blanket was constructed on the subgrade, for the width of the tunnel section, with keyways at intervals to resist the tendency of the tunnel arch to slide downhill. Membrane water-proofing, consisting of fabric and tar 8 plies thick, was installed on this slab. A segment of the arch invert was then poured and cured. An inner form traveler was erected on rails placed on the invert, reinforcement installed, the outer form traveler moved into position and the main arch concreted in a single pour. The roadway haunches and slab, the curbs, the sidewalk and the conduit casings were poured in subsequent, separate pours.

On the south side, concreting was generally accomplished by dry batching through a single-drum 34-E Koehring paver and transporting through an 8-in. Rex pumpcrete machine to the placement location. On the north side, concrete was mixed in the same paver and placed by a crawler crane with a bucket. In addition, some ready-mixed concrete was used. Ports in the outer forms permitted placing the concrete without excessive vertical drop. The concrete was vibrated through these ports to insure a dense concrete, despite the heavy reinforcements.

After the arch concrete was properly cured, waterproofing membrane was applied over the entire arch and protected with celotex insulation. The trench was then backfilled, using permeable material close to the arch and spoil from the excavation for the remainder of the backfill. The dikes outshore of the joints were removed by dredging and the tubes connected to the transition joints by subsequeous methods similar to the manner in which the tubes are joined together. As a precaution, the trench between the inner and outer dikes was filled with water to the Ship Channel level and the arch sections proved watertight before the outer dikes were cut.

Automatic Operation

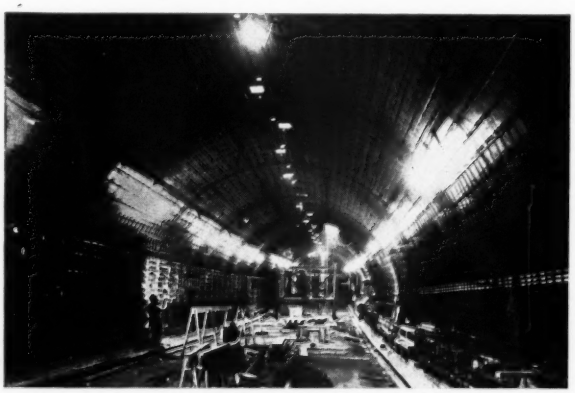
The tunnel is practically automatic in its operation. Three Sturtevant blower fans installed in the ventilation building discharge fresh air into the air duct under the roadway, whence it passes through side air ports into the traffic tube to the portals. Each fan is equipped with a 300-h.p. motor for high speed operation and with a smaller 2-speed motor for operation at lower speeds. At top speed, each fan has a capacity of 342,000 c.f.m. Two of these fans can supply the maximum amount of air required, while the third is used as a stand-by unit. The stage of ventilation is automatically selected by electronic controls which are actuated both by a device which maintains a continuous count of the number of vehicles in the tunnel and by a device which continuously analyzes the air in the tunnel and measures its carbon monoxide concentration. This concentration is always kept below 4 parts per 100,000, which is encountered at some busy intersections.

The tunnel is lighted by a continuous slimline fluorescent lighting fixture located at the crown of the arch, and by supplementary lighting to provide higher intensity near the portals. Pumping stations are provided at each portal to handle rainfall from the open ramps, and at the lowest point of the tunnel at mid-channel to handle any water accumulating from the seepage or washing operations.

The following summation of facts about the Pasadena Tunnel should prove interesting reading: total estimated construction cost, $6,902,730.42; total length, 3791 feet; distance between portals, 2936 feet; length of tube section, 1500 feet; lengths of north and south concrete arch section, 718 feet each; length of north open ramp, 325 feet; length of south open ramp, 530 feet; roadway width, 22 feet; headroom in each lane, 13 feet 6 inches; headroom in center of roadway, 18 feet; internal diameter of tubes, 32 feet; external diameter of tubes, 38 feet; maximum grade, 6%; maximum depth, mean low water to top of tunnel, 45 feet; maximum depth, mean low water to roadway, 68.37 feet; maximum low water to bottom of tunnel, 80 feet; maximum length of single tube section, 375 feet; excavation 289,600 cu. yds.; tremie concrete, 11,750 cu. yds.; structural steel in tubes, 2,373 tons; reinforcing steel, 3,218,000 lbs.; ceramic tile, 1,061,000 tiles; number of fans, 3; maximum ventilation per minute (2 fans), 760,000 c.f.m.; time required for complete air change, 2 minutes.

The project is divided into four principal contracts. Merritt, Chapman and Scott Corporation of New York, N. Y., has the main contract for the construction of the tunnel and ramps at $6,331,062. The Pfeiffer Electric Company of Houston and La Porte, Texas, has the contract for the electrical and mechanical work at $449,500. R. P. Farnsworth & Co., Inc., is providing and installing the ventilation equipment under a third contract for $84,000. Farnsworth & Chambers has the contract for the approach roads at $153,923.

Holing through ceremonies were held on February 17th and it is expected that official dedication of the tunnel will be held during the first part of this month.



Interior view of tunnel at Pasadena, Texas, before concreting and tiling, showing walk-way forms to right and electric cables at left.

Miami Beach Solves Parking Problem

By Tom F. Smith
Director, Miami Beach News Bureau, Miami Beach, Florida

MIAMI BEACH has found in off-street municipal parking areas a soothing sedative for traffic headaches that are plaguing most American cities in their post-war growth.

A brief glance at figures will convince the most skeptical that Miami Beach's parking problem, had it been permitted to flourish unattended, would have borne its full share of vexed visitors (upon whom the city's livelihood depends) as well as irate residents.

The 1940 census gave Miami Beach a population count of 28,012. Present population is estimated at nearly 50,000. This figure is almost tripled in winter during the primary visitor season and possibly doubled during the summer vacation months. In addition, thousands of persons from nearby mainland communities lacking ocean bathing facilities, drive to Miami Beach regularly for swimming.

The result is a steady stream of traffic pouring into a community having as its chief attractions a mild year-'round climate, an eight-mile stretch of ocean frontage from its southern to its northern boundaries, and picturesque beaches, with most of the drivers *looking for a place to park.*

Fortunately, Miami Beach was provided with an unusual amount of open park space by the city's founders. The city was blessed, too, with councilmen and officials who long ago realized the growing traffic problems had to be solved, and who have done something about it. Dependent as the city is upon its appeal to vacationers, it was recognized that continued parking annoyances would cause great injury.

This early-morning picture shows the Lincoln Lane parking area, just north of Lincoln Road, before the usual daily rush of shoppers. Nearly 1,000 automobiles can be accommodated in this metered lot in the heart of the city's most congested business area.
Miami Beach News Bureau Photo

Method of Financing

So, in 1941, one of the first measures of its kind, was presented the Florida legislature by Miami Beach officials. This measure, enacted into law, caused Miami Beach to become one of the nation's first cities with legislative authority to issue bonds to provide off-street parking areas and to operate these areas as an integral part of the municipal government.

With this authority, Miami Beach was ready to initiate its attack on the even then-threatening parking problem when the program had to be pigeon-holed because of the war. But during the war years, when Miami Beach was practically a training camp for the U. S. Army Air Forces and visitor trade was at a standstill, City Manager Claude A. Renshaw and other city officials did not forget that parking would arise as an even thornier problem when peace returned. At the cessation of hostilities they were ready to go ahead.

Freeholders voted favorably upon a $300,000 bond issue designed to finance the start of an off-street parking program. However, only $14,043 of this money has been expended. Special city council appropriations, coupled with the fact that the city owned several parcels of property well situated for parking areas, made it unnecessary to dip deeply into the initial bond funds.

To finance its parking areas, Miami Beach has the authority to issue either general obligation bonds, with taxes pledged for their payment, or special revenue bonds backed only by off-street parking meter returns, or both. It was found advisable last year to amend the original 1941 act so that the city may pledge all parking meter revenue, rather than that from only the off-street areas, to the parking expansion program. This parking revenue will finance adequately the ambitious program.

Under the legislative enactment providing for issuance of the revenue bonds, a maximum of 40 years is allowed for their amortization. Such bonds issued or contemplated to date, will be amortized in a far shorter period. Provided no severe business depression is encountered, bonds outstanding and proposed can be paid in possibly 12 years, certainly no longer than 20 years, city officials believe.

Present Operations

At present Miami Beach is operating four principal parking areas. The largest of these is known as Lincoln Lane and accommodates 951 automobiles within one block of

the city's busiest shopping street—Lincoln Road. Palm View Park, which also serves Lincoln Road business people and shoppers, has a capacity of 72 cars, and will be absorbed in the Lincoln Lane area under present expansion plans.

Another area is located within a block of the ocean on busy Collins Avenue between 21st and 22nd Streets, in the heart of a large hotel district. This extremely valuable property will accommodate 168 automobiles and is used by bathers and hotel guests. The fourth off-street area is in the rapidly growing northern portion of the city, adjacent to the municipal North Shore Park. Its capacity is 312 cars and it serves a shopping area as well as a recreation center.

In developing three of these areas the city was able to utilize property already owned by the municipality. Special council appropriations of $131,485 paid for development of the four areas, including paving, sidewalk and curbing, landscaping, lighting and other improvements. These four areas have a total capacity of 1,503 automobiles. Present on-street meters increase Miami Beach's metered parking spaces to 3,574.

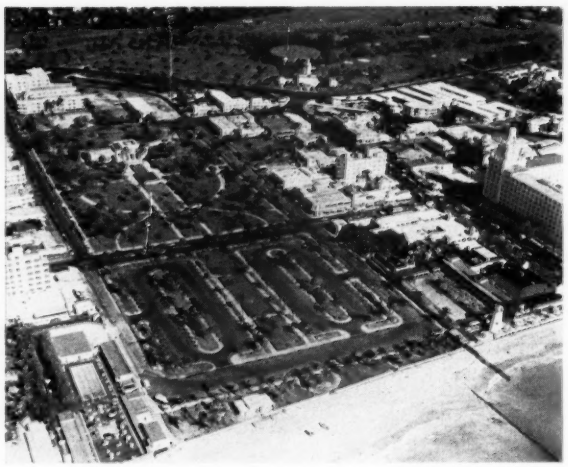
One of the features of the program is the provision of parking stations at intervals on Lincoln Road, Washington Avenue and in other congested areas where bonded attendants will take charge of cars for those desiring the service and park them in the parking area provided by the city. The car will be returned to the owner either at the station at which it was originally left, or at any other station at which he may call.

This arrangement will make it possible for one to leave his car at Alton and Lincoln Roads, for instance, and for a nominal charge have it parked and delivered to him at Lincoln Road and Washington Avenue or at any other station he may desire. The space interval between these stations will be determined by experience, but generally they probably will be two blocks apart with closer intervals in the more crowded areas.

This portion of the plan will be placed in operation when the present off-street parking areas have been expanded. When it has been fully developed, City Manager Renshaw said, it probably will be advisable to practically eliminate street parking in locations where it is in operation.

The Future Program

Contemplated expansion will place another 1,020 off-street spaces in public use. Cost of this expansion is estimated at $1,500,000. The city expects to issue $1,500,000 worth of revenue bonds, pledging all net parking meter revenues as security, to finance this program. These are the bonds which will be retired in from 12 to 20 years.



Parking is provided for 168 automobiles in this very valuable site along the ocean in the heart of the hotel district, Miami Beach. The city operates the metered parking lot on part of the land originally included in Collins Park, where the municipal library is located just across the street.

Miami Beach News Bureau Photo

Revenue obtained from meters by the city of Miami Beach during the 1948-49 fiscal year reached a gross total of $167,929. Cost of operating the meters was $19,196. Time limits on the meters vary from 12 minutes for a penny in congested areas to 10 hours for 25 cents in the off-street lots.

However, Miami Beach is not in the parking meter business as a revenue producing measure. City Manager Renshaw has emphasized this from the start. In 1945 he told the city council that net revenue, if any, obtained from the meters would be incidental.

Details of the present off-street parking program were adopted after considerable study, begun long before the war. The project was launched before production of new automobiles was increased and travel restrictions were lifted after the war.

It has been City Manager Renshaw's contention that it would be an obvious injustice to taxpayers who derive no

During busy hours Miami Beach's Lincoln Lane municipal off-street parking area looks like this, with automobiles in every metered space. Although the lot accommodates 951 cars, an expansion already is on the city's drawing boards.

Miami Beach News Bureau Photo

This comparatively small parking area provides some relief for congestion near the western end of Lincoln Road, Miami Beach. Future plans call for expansion of present parking areas here and along Lincoln Lane to a point where they will, for all practical purposes, join.

Miami Beach News Bureau Photo

(*See* MIAMI BEACH, *page 317*)

Traffic Signal Control In The City

By Kenneth S. Vaughan-Birch (Assoc. Mem., ITE)
Traffic Engineer, Vancouver, B. C., Canada

This discussion concerns two traffic signal control problems which we encountered in our city, how they were treated and a brief review of our findings and program relative to the uniformity of traffic signal head position throughout the city area.

First Problem

General Conditions

The first problem occurred at a normal four-way junction. Street car traffic travelled north and south through the intersection. A comparatively heavy left-turn movement from the south to west created the problem. Drivers making this turn go onto a viaduct which takes them to the westerly portion of the downtown area, an important part of the central business district. Consequently for political as well as other reasons it is not possible to prohibit the turn.

In 1943 at the time of the original survey preparatory to the change of the signal system, the north and south approaches were limited to one lane between the street car track and the curb. The north-south street was a trunk route used by a number of street car services which combined produced a headway of approximately thirty seconds on each track during the morning and evening maximum flow. The frequency of street car movement in itself discouraged free-wheel traffic from travelling on the track area.

Traffic Volumes

Volumes (excluding street car traffic) during the maximum fifteen minute periods were as follows:

North-south:—from the north, maximum fifteen minutes, 147 vehicles (average spacing 2.45 seconds).

East-west:—right turn from west maximum fifteen minutes, 92 vehicles (spacing 3.49 seconds).

Left-turn Movement from south: maximum fifteen minutes 53 vehicles—(the measured spacing for this movement was not used because the proposed new system would change its circumstance).

It will be seen from these figures that while the individual volume was not large some difficulty was created by its confinement to one lane. This, however, was not the trouble. The main problem arose from the comparatively heavy left turn movement from the major street across and in face of the free-wheel and street car traffic. There was considerable congestion and delay to street car service, which was particularly important during those war years.

Accident Record

More outstanding still, the situation resulted in the intersection being one of the city's worst accident locations. The majority of the collisions involved street cars. Between thirty and forty accidents occurred annually at this junction, yearly property damage totalled over the $3,000.00 mark. Most of the accidents were head-on turning collisions involving the left-turn movement from the south.

Remedial Measures

The segregation of this left-turn movement was clearly the remedy for the majority of the trouble and consequently a three-phase traffic signal control was designed, one phase being given to that movement. The street car traffic travelling next to the centre of the roadway, however, created a difficulty. Vehicles destined to make the left-turn movement from the south could not be accumulated in a left-turn lane along the centre of the road in the normal way.

Fortunately the sidewalk bordering the south approach was fairly wide and so we were able to overcome our difficulty by cutting it back and widening the pavement sufficiently to accommodate two traffic lanes and also a four foot wide island. This island, constructed next to the street car tracks, performed two functions—it segregated free-wheel from street car traffic and also provided a loading platform for street car passengers (Fig. 1).

At the intersection end of the island a signal standard was installed carrying two signal heads, the head on the street car side of the standard being used to control street car movement and the head on the opposite side the traffic destined to make a left-turn. The lane next to the sidewalk was used for through traffic movement. The signal heads governing the general movements were placed in the normal far-right and far-left positions, arrow lenses, of course, being used to control traffic approaching from the south.

As indicated in the figures regarding traffic volumes previously quoted the major east-west movement was the right-turn off the viaduct from the west (which was complementary to the left-turn movement from the south).

Signal Phases

The whole picture resolved itself fairly clearly into a three-phase proposition as follows (Fig. 2):

1st Phase—North-south—Right of way given north-south traffic without restriction except for the left-turn from the south, this being held and, of course, street car movement north-south being permitted.

2nd Phase—Left-turn from south—All traffic approaching from the north stopped; street car traffic approaching from the south stopped; the left-turn from the south given right-of-way and the straight through free-wheel traffic from the south permitted to continue; simultaneously the right-turn from the west given the right-of-way.

3rd Phase—East-west—Traffic on both north and south approaches stopped; east-west traffic given the right-of-way without restriction including the right-turn

Fig. 1

from the west which, of course, continues.

The benefit of this arrangement was that the heavy flow of through traffic from the south was permitted to continue through two phases, similarly with the right-turn movement from the west and lastly, the main feature, the left turn from the south completely removed from conflict.

There is comparatively little pedestrian movement at this point and therefore the turning movement of vehicular traffic did not jeopardize the safety of pedestrians.

This treatment was reasonably obvious, of course, and is no doubt paralleled in many cities. Possibly its only distinction is its separate control of street car and free-wheel traffic on the one approach. This was made possible by a specially designed louvre shielding the signal lenses, which cut off vision of the street car signal on the island at an extremely acute angle.

Cost and Result of Changes

The cost involved in the treatment of this intersection embracing both the change in signal control, the widening of the pavement and construction of an island, together with adequate lighting for the island was approximately $4,600.00.

A comparison of the accident history for the twelve months preceding the change-over with the twelve months following showed very satisfactory results. All traffic accidents had decreased by 47%, those involving street cars by 73%. The estimated cost of property damage was reduced by approximately $2,000.00. These substantial decreases occurred at the same time that traffic accidents throughout the city area had increased approximately 6%.

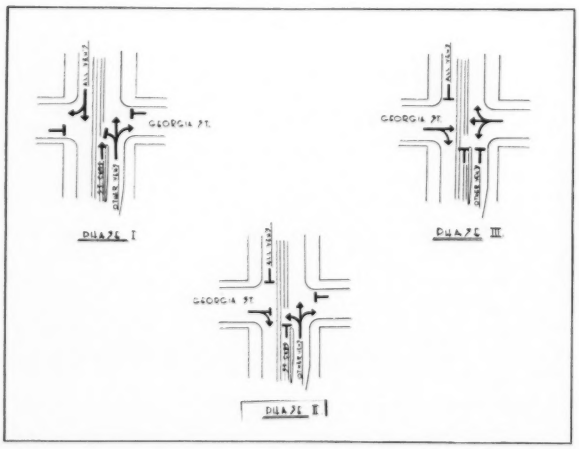


Fig. 2

Second Problem

General Conditions

The second problem occurred also at a normal four-way intersection. To indicate the traffic conditions at this junction it should be explained that Vancouver is somewhat singular with respect to the main shopping streets in its downtown area. The city's main stores are on Granville and Hastings Streets which join to form an "L", almost a ribbon type of development. With the increase in population and the conversion of many street car services to trolley coach operation this situation is changing but until quite recently street car traffic was confined to two main routes through the city area, the more heavily travelled one being formed by these two streets, Granville and Hastings Streets. The result of this was that a quite heavy left and right turn movement of traffic (particularly of street cars), generally took place at this intersection. Another feature was that the more important retail stores were on the north side of one street and the east side of the other. Consequently pedestrian traffic is heavier in the east crosswalk of the junction where these two streets intersect.

In this case also vehicular traffic volumes were not particularly heavy but with the two-phase signal system, which was in operation at the time the study was made, conflict between pedestrian and vehicular traffic was created irrespective of the signal right-of-way because of the heavy left and right turn movements. This obstruction became quite serious. Checks showed that more than 3100 persons per hour crossed the street at this intersection. As a result vehicular traffic was badly obstructed and became congested or alternately, pedestrian traffic was similarly held up. This congestion also produced a recurrence of minor accidents.

Remedial Measures

To correct this situation a three-phase signal was installed, one phase being used exclusively for pedestrian traffic, all vehicular traffic being stopped during that period. A sixty second cycle was used which, while extremely short for three-phase operation, was reasonably satisfactory. A greater number of vehicles were passed through the intersection even though vehicular traffic was stopped by the signal for a greater percentage of the cycle time than had previously been the case.

This was due to the removal of the former conflict. Pedestrian traffic was similarly expedited and the shorter cycle helped to curb the pedestrian's impatience and was designed for that purpose. A slight reduction of accidents was brought about although it was not outstanding in this respect.

Many requests have subsequently been received to introduce a similar system at other downtown intersections. A separate pedestrian phase is, of course, not new. No doubt it has been tried in many cities with success. It is however, a special treatment and not one which can be applied to every downtown intersection as many of our pedestrians seem to feel.

Pedestrian Obedience to Signal

Possibly the noteworthy feature in this case is that during the pedestrian phase pedestrians cross in every direction,

Fig. 3

straight and diagonally. This gives an impression of tremendous confusion and strangers stand in amazement when they first see it (Fig. 3). This practice was frowned upon at first but was not prevented since in this instance no harm was done. With reference to pedestrian obedience it should be stated that, anticipating some difficulty in enforcement upon the advent of the system, a public address system was installed for use by the police officer on duty at this intersection. Initially this was used constantly to instruct pedestrians in the proper observance of the signal and later on to speak to the odd one who failed to obey it. Altogether the results were quite satisfactory. The pedestrians observe this signal very well and are all sufficiently clear of the roadway not to obstruct traffic movement in the succeeding vehicle phase.

Standardization of Signals

A short while ago the city reached a rather fortunate stage with respect to the general signal situation. Unlike many of the States' cities which are "bursting" with money Vancouver has suffered a prolonged "recession" in its traffic signal work. The depression and then the war had ruled out practically all new signal installation work. As a result it was not until 1947 that plans were made with any assurance that they might be translated into action.

At that time Vancouver was very much under-signalized and almost all existing systems had old induction-type motor controllers with four-way signal heads suspended at the center of the intersection. Most of them had been in operation since the '20's.

One of the features needing correction was the variation in signal head position, which in some cases occurred at adjacent intersections. The whole circumstance provided a very excellent opportunity to get sufficient money appropriated to bring about a complete revision. The question, therefore, was what signal head lay-out should be adopted (we will not discuss the question of controllers other than to say that, at the same time, we prepared complete specifications for signal controllers using basically the ITE specifications). Uniformity of signals and standardization as far as might be reasonable, particularly with respect to the other Pacific coast cities, was a desirable objective. Accordingly information was obtained covering the standards and practices in States cities in this regard.

Installations in Other Cities

With respect to the other cities it was apparent from an analysis of a summary of signal installations and comments of sixteen major U. S. cities (compiled by the Los Angeles Bureau of Street Traffic Engineering) as well as other available information that the Manual on Uniform Traffic Control Devices has not been too closely followed. However, the majority of installations in cities in recent years appeared to be *corner-mounted,* probably because of the recommendations of the Manual.

The summary indicated it is almost unanimous that corner-mounted signals are best for pedestrian control. A number of cities which have installed corner-mounted signals for vehicular control have found it necessary to supplement many of them with mast-arm or cable suspended units because of the interference of illuminated street signs and short sight distance. The California State Highway Department suspend their signals on a mast-arm over the lane which the signal is intended to direct. This policy seems to be favored in rural or suburban districts where speeds are relatively high and a fairly long sight distance is required. Some cities favor the suspension of signals over lanes to be controlled as a general rule instead of using suspended units just to supplement corner pole-mounted signals.

One definite conclusion which can be drawn is that center-suspended signals are no longer approved. The term "center-suspended" is used to designate signals which are suspended over the geometrical center of the intersection. Only five of the sixteen cities in the Los Angeles summary have any intersections with only center-suspended units. Center-suspended signals are used to a small extent, however, to supplement corner-mounted signals, but most cities prefer far-side suspension for this purpose. Many cities report that they do not favor center-suspension under any consideration.

Basic Signal Head Arrangement Adopted

From local experience and the experience of other cities, and for the sake of conformity with recent trends in traffic signalization standards, it can be said with reasonable assurance that center-suspended signals should no longer be considered. The problem therefore resolves itself into the installation of far-side suspended units, corner-mounted units, or a combination of both. As both mounting positions have desirable features and since two signal faces, as recommended

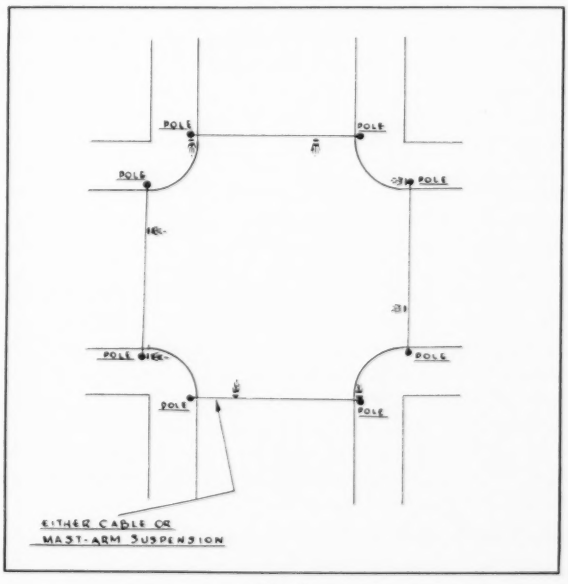


Fig. 4

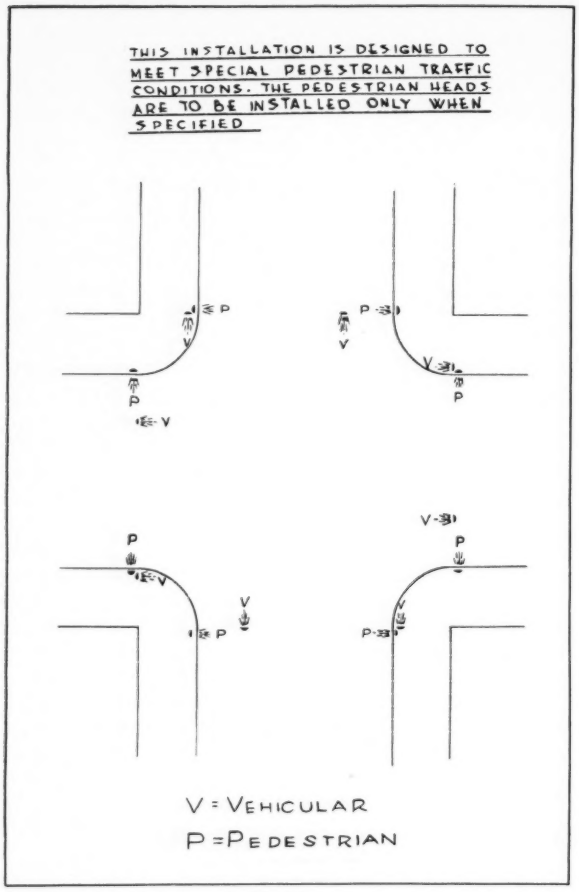

THIS INSTALLATION IS DESIGNED TO MEET SPECIAL PEDESTRIAN TRAFFIC CONDITIONS. THE PEDESTRIAN HEADS ARE TO BE INSTALLED ONLY WHEN SPECIFIED
V = VEHICULAR
P = PEDESTRIAN

Fig. 5

by the Uniform Manual, should be provided for each direction, the combination of the two positions appears to offer the best form of control.

As a result of these conclusions and consequent discussions, the basic signal head arrangement adopted for the City of Vancouver embraces two signal heads for each direction, one mounted on the far-left corner and the other suspended over the right-hand side of the street approximately ten feet from the curb at the far-side of the intersection. This would appear to be a satisfactory arrangement, especially in suburban areas where fairly long sight distances are required. The suspended unit provides good sight distance and when a vehicle is stopped at the signalized intersection, the driver is provided with a corner-mounted signal as well as the suspended signal for a quick start. With two signal heads at slightly different elevations the problem of sun glare is reduced to a minimum, if not completely eliminated.

The pedestrian proceeding on the left-hand side of the street is controlled by a corner-mounted signal ahead of him, whereas the pedestrian on the right-hand side has a suspended signal ahead of him and slightly to his left where it is quite easily seen. In suburban areas where the pedestrian movement is generally light, this type of signalization should prove satisfactory (Fig. 4).

Pedestrian Signals

In the downtown area where pedestrian volumes are heavy it may be desirable or even necessary to install separate pedestrian signals. The basic layout at such locations will be augmented with separate pedestrian signal heads covering all directions of walk. Such pedestrian control is warranted where pedestrian traffic is heavy and where better right turn movement of vehicular traffic is required (Fig. 5). The most important feature of the proposed signal head layout is that it permits uniformity throughout the city. Abnormal intersections of any type no longer become exceptions to the general rule.

We have now installed signal systems at a number of locations previously uncontrolled using the signal head layout described and have found the general reaction from motorists to be quite favorable. It would appear that they are particularly impressed with the long distance visibility which enables them to regulate their speed so as to conform with the signal and avoid stops.

Open Discussion

Truck Loading Facilities

I HAVE read with great interest the article "Truck Loading Facilities as Related to Parking," by Charles A. Goodwin, in the February 1950 issue of TRAFFIC ENGINEERING. There are several comments I would like to make concerning the article.

First, in relation to the standards suggested by Goodwin on page 190, would it not be better to make the length in terms of a parking meter space or a parking space, rather than an odd length of 25 or 30 feet? In the downtown area of cities where parking meters are installed and where parallel parking is in vogue, truck loading zones could be established much easier on a basis of parking stall lengths, rather than an odd length.

Second, under Mr. Goodwin's warrants on page 190, it appears to me that there should be some warrant relating to the number of truck loading zones per block or per lineal feet of curb space. We have a warrant in Wichita which specifies that no truck loading zone shall be within 150 feet of another. Some such warrant enables local authorities to determine more specific need for a particular request.

Third, under Mr. Goodwin's restrictions, it is my firm belief that tractor trailers should not be permitted in central business districts, regardless of the size of load. They are too long to use loading zones; they are too big to get into most alleys, and consequently, I believe all materials should be brought into the central business district by smaller trucks from outlying docks or loading centers. In Wichita, we specify that no trucks over 25 feet long can use truck loading zones.

Fourth, Mr. Goodwin is perfectly right when he says on page 190 that ". . . yet the heavy demand by trucks for alley space should indicate that vehicles not actually engaged in loading or unloading operation must be prohibited, at any time, from parking in alleys or at the curb returns of alley entrances." Wichita specifies by ordinances that no passenger vehicles are allowed to park in alleys, and this provision is strictly enforced. In order to further open up alleys for truck and delivery service, parking is restricted to one side of the alley. Even standing is not allowed on the other side of the alley. This restriction has proved to be very advantageous to delivery people.

Fifth, the City of Wichita also has a restriction similar to that one in Providence, Rhode Island, which prohibits all deliveries and pick-ups in the central business district from 4:30 P.M. to 6:00 P.M.

To date, we have established in the City approximately 45 truck loading zones in the downtown business area and they have reduced truck double-parking considerably. Strange as it might seem, we don't get too many applications for such zones.

I believe that this is the kind of article that we traffic engineers in the field like to read, and all of us should submit our comments concerning any such article which appears in the magazine.

George J. Fisher (Member, ITE)
Traffic Engineer, Wichita, Kansas

I appreciate the opportunity to review Mr. Fisher's comments on my February article entitled, "Truck Loading Facilities as Related to Parking." Discussion along these lines has long been necessary, particularly with regard to the establishment of workable standards for design and regulation of curb space for commercial vehicle operations in urban areas.

The work of Mr. Fisher and his staff toward correction of the evils of truck loading in Wichita merits the respect and consideration of all individuals and agencies confronted with every day problems of congestion and operational inefficiency common to urban pick-up and delivery.

With regard to Mr. Fisher's constructive comments, I shall attempt to remark intelligently on each, in the order given:

First: I recommended a preferred length for truck loading zones of 30 feet or multiples thereof on the basis of known average commercial vehicle lengths, without regard to metered parking stall lengths.

I agree entirely with Mr. Fisher that, where truck loading zones are established in metered areas, the zone length should be placed on parking stall lengths, particularly when zones are established *after* meters have been installed; in which case certainly no less than two metered stall lengths should be allotted per zone for the average straight truck.

However, when it is possible to establish truck zones *previous* to or *apart from* meter installations, 30 foot zones or multiples thereof are indicated by average vehicle lengths. Straight trucks average 20 feet in length and tractor-trailers, 40 feet. I found from a study of minimum turning radii that these predominent commercial vehicle types require an additional parking space of approximately ⅓ their length to maneuver free of conflict. Hence, the average straight truck would require a zone about 27 feet long and the average tractor-trailer, a zone about 54 feet in length. The recommended preferred truck zone of 30 feet or multiples thereof seemed justified, therefore, on the basis of vehicle length requirements.

Second: Before any satisfactory warrant could be established relating to the number of truck loading zones per block or per lineal foot of curb space, it would seem that the commercial vehicle demand characteristics of various districts should be considered. The Wichita warrant specifying "that truck loading zones shall not be within 150 feet of each other" would, for example, prove ideal in the central business district of Boston, yet it would prove completely inadequate in the wholesale leather, textile, or food districts. Like all the phases of this problem, warrants should be established only after careful, impartial studies have been conducted, then the warrants can be properly tailored to the needs of the various districts affected.

Third: It is true that the operations by tractor-trailers in the central business district create serious traffic problems and in many cases have proven impractical and un-economical. However, there are and will continue to be a number of cities wherein this type of bulk transport is vital to economic stability. I refer, particularly, to many important cities in the East which are a planner's nightmare of overlapping industrial, business, residential, and other zones, and superimposed over these jigsaw puzzles are heavily traveled arterial routes which often bisect the heart of central business districts.

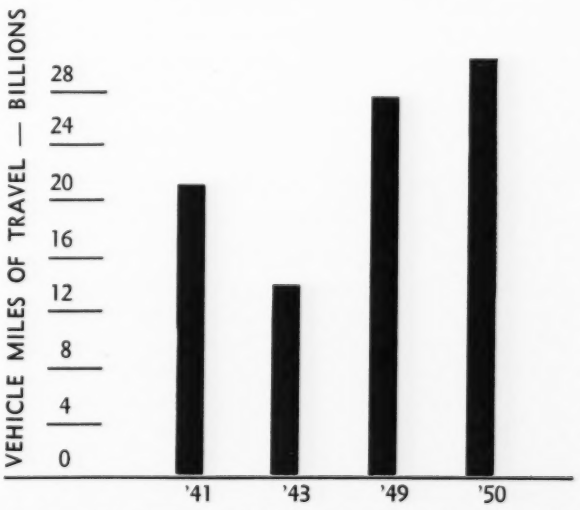
Drastic blanket prohibition on tractor-trailer operations in any district of a city is not justified unless all *less* restrictive measures are proven impractical. In fairness to the commercial transport interests involved, and in order to meet the needs of cities in which tractor-trailer operations cannot be completely eliminated in or immediately adjacent to the C.B.D., I have suggested two-ton loads as minimum justification for permitting tractor-trailers to use loading zones.

It should be apparent that any standards of design and regulation pertaining to commercial vehicle operations on city streets must be made flexible to accommodate local conditions. Controls which are completely applicable in Wichita will not, necessarily, prove so in New Haven, Philadelphia, or Boston.

Nevertheless, it is most encouraging to note that some basic formula is possible for truck loading zone design, warrants, and restrictions. Perhaps one of the ITE Technical Sub-Committees can develop such a base or skeleton (similar to the off-street design standards) upon which Institute members can construct effective controls to solve their local truck parking problem at the curb.

Charles A. Goodwin (Jun. Mem., ITE)
Director, Traffic Safety Bureau
Liberty Mutual Insurance Company

Traffic Trends



TRAVEL ON RURAL ROADS FOR FIRST TWO MONTHS OF 1941, 1943, 1949 and 1950.

Based on Bureau of Public Roads Data

Pass On The Left, Drive On The Right

By George W. Bullock
Traffic Engineer, City of Burbank, California

In the construction of the majority of today's four-lane highways, a single type pavement is used for all travelled portions of the roadways. On these, the driver may choose to operate his vehicle in one of several positions on the roadway yet still be safe from oncoming traffic.

On an all-concrete pavement, the only incentive for motorists to consider the rules of the road regarding driving on the right and passing on the left is of a legal nature. Some drivers do not have much concern for purely legal incentives and require some physical incentive to induce them to adhere to the rules of the road.

A type of roadway that has design features which offer this incentive is the dual type pavement in which the passing lane in each direction is of a course aggregate penetration-type macadam, while the driving lane consists of concrete. A section of this type of roadway is shown in Figure 1. The use of these two construction materials to differentiate between the lanes is, through the medium of added noise and vibration as well as color difference, a strong incentive for vehicle operators to keep to the right under normal driving conditions. It also tends to bring about a quicker and cleaner overtaking and passing movement.

The object of the study described herein is to compare the manner in which vehicles are operated on the black-and-white roadway with the manner in which vehicles are operated on a standard four-lane divided all-concrete highway. The three points considered in regard to the operation of vehicles on each type roadway are: (1) the lateral placement of vehicles on the roadway; (2) the location of vehicles operating within the right lane; and (3) the overtaking and passing movement of vehicles.

Fig. 1
Black and white pavement on which operational characteristics of vehicles were studied.

Lateral Placement

The lateral placement of each vehicle was taken as one of four positions on the two lanes allocated to its direction of travel:

Position 1—The vehicle entirely in the outside or driving lane.

Position 2—The vehicle partially in the inside lane but more than half in the outside lane. The vehicle was classified in this position if any left tire touched the lane divider-strip.

Position 3—The vehicle partially in the outside lane but mostly in the inside lane. The vehicle was classified in this position if any tire on the right side of the vehicle touches the lane divider strip while travelling in the inside lane.

Position 4—The vehicle entirely within the inside, passing lane.

In order to qualify the placement of the vehicle as to its usage of the roadway, two general classifications were used: proper, and improper. To be classified as making proper use of the roadway, the vehicle had to be in Position 1 when travelling singly. It was also constituted a proper usage of the road if a vehicle in Position 2, 3 or 4 was in the act of passing another vehicle that was travelling in Position 1 within an estimated distance of 200 feet. At all other times, when a vehicle was not in Position 1, or about to make a left turn from Position 4, it was classified as making *improper* use of the roadway.

Data was normally collected during the daytime with clear weather. Some observations were made during wet weather and some at night to see whether or not the vehicle operators used the road similarly during different operating conditions.

The lateral placement of the vehicles on the roadway was observed at two points on each type roadway, on a tangent section and on a curve to the left. Both curves were on level ground with a curvature of three degrees and fifty minutes for the white road and four degrees and ten minutes on the black-and-white road.

The percentage of commercial vehicles operating on either roadway during the study was never in excess of five per cent. The roads studied had no long or appreciable grades. It was felt that commercial vehicles would not greatly influence the traffic and therefore they were not considered as a separate type of vehicle.

Mr. Bullock was a student of the 1948-1949 class of the Yale Bureau of Highway Traffic. This article is the eighth in a continuing series based on information obtained by students for thesis requirements.

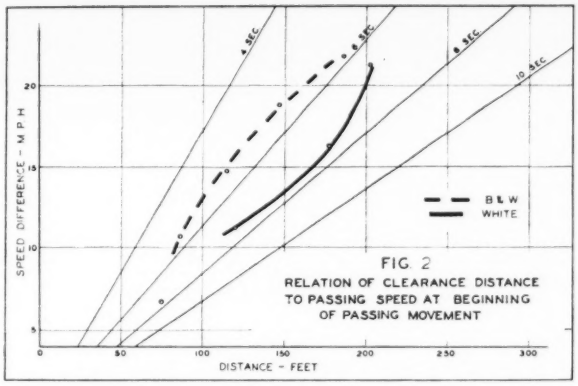


FIG. 2
RELATION OF CLEARANCE DISTANCE TO PASSING SPEED AT BEGINNING OF PASSING MOVEMENT

By plotting the per cent of vehicles making improper use of the roadway against the volume of vehicles per hour, a good picture of the influence of volume on use of the roadway was shown.

Under daylight and clear conditions, the percentage of vehicles in an improper position on the white roadway remained close to 10 per cent throughout the volumes observed. On the black-and-white pavement, this figure was below 4 per cent and in some cases, zero. The observed improper usage on the curbed sections were only slightly higher than on the tangent sections. This would indicate that the tendency to cut the corner on such gradual curves is negligible.

It was hoped that the influence of volume on the placement of the vehicles on the roadways could be shown. It seems, though, that much higher volumes would have to be counted before the volume would have an influence in reducing percentage of vehicles making improper use of the roadway on the white pavement.

Either at night or during rainy weather, the percent of vehicles travelling in an improper position was in general higher than for daytime observations in clear weather. This higher percentage was due mainly to vehicles operating improperly in Position 2.

Through this part of the study, it is quite evident that the black-and-white pavement has some influence on the position that a vehicle operator will take on the roadway. This influence tends to make the vehicle operate in the proper position and is most pronounced during clear weather and during daylight hours.

Location of Vehicles Within the Right Lane

Observations were made to determine whether the presence of the darker and rougher passing lane adjacent to the lane in which the vehicle is operating has any influence on the position of the vehicle. Tangent sections of roadway were chosen in which the shoulders were quite similar in construction and durability. The right lane was divided into three positions depending upon how far the left wheel of the vehicle was from the dividing strip between the lanes. These positions were as follows:

Position A	0 to 18 inches
Position B	18 to 36 inches
Position C	Over 36 inches

Vehicles riding on the division lines between these positions were assigned alternately to each adjacent position. Vehicles riding with the left wheels on the divider strip were classified as not in the right lane, but rather as operating in Position 2, as designated in the study of the lateral placement of the vehicles across the roadway.

During this study, the volumes on the white pavement were higher than the volumes on the black-and-white. The fact that there were more vehicles passing on the white pavement may have tended to move a higher percentage of vehicles into Position B or C which might otherwise operate in Position A when not being passed. Under these conditions, there were still 14 per cent more vehicles operating in Position B on the black-and-white pavement. This difference is not great, but it shows that the darker and rougher pavement does have some influence on the operators in regard to the placement of their vehicles in the right lane.

Overtaking and Passing Study

Passing movements of vehicles on the roadway types studied were compared to determine what influence the darker and rougher passing lane of the black-and-white roadway has on the operational characteristics of the driver.

If no other vehicles are close enough to interfere, driver of the passing vehicle may choose as he wishes when to begin the passing movement and when to return to the righthand lane to complete the passing movement. By comparing the distance at which vehicles begin and end the passing movement on both type roadways, the effect of the dark macadam on the operational characteristics of the driver is shown.

The overtaking and passing study was made from a moving vehicle with the aid of a camera and two stop watches. The camera was used to determine the distances at which the passing vehicles began and ended the passing movement. This is quite similar to the method used by Matson and Forbes in their study, "Overtaking and Passing Requirements as Determined from a Moving Vehicle" published in the *Proceedings* of the Highway Research Board, Volume 18, 1938.

The camera was calibrated by taking pictures of a 1948 Chevrolet at measured distances of 100, 150 and 200 feet from the nearest point of the tire treads. As the tread widths of the majority of standard passenger vehicles vary only slightly, it was felt that no appreciable degree of error would be introduced into the measurements by using the 1948 Chevrolet tread width as a standard for all of the measurements.

The use of a large negative ($3\frac{1}{4} \times 4\frac{1}{4}$ inches) made it possible to measure the tread width of the observed vehicle directly from the negative. Measurements of tread widths were made to the nearest .005 of an inch and estimated to the nearest .001 of an inch. At 150 feet, an error of .005 of an inch introduced a variation of four feet in the calculated distance that the vehicle was from the camera.

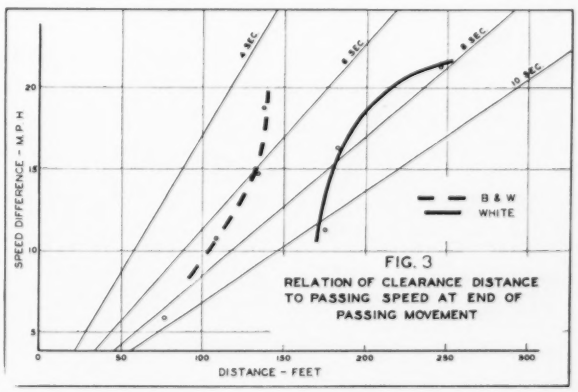


FIG. 3
RELATION OF CLEARANCE DISTANCE TO PASSING SPEED AT END OF PASSING MOVEMENT

The variation in tread widths between cars introduces the greatest error. The extreme variation in tread widths of the cars observed and that of a 1948 Chevrolet was approximately three-tenths of a foot. This variation was found on the larger cars where the tread widths were wider than the 1948 Chevrolet. This variation of greater tread width would tend to reduce the calculated distance between the camera and the photographed vehicle. At 200 feet, this reduction in calculated distance would be approximately eleven feet, and at shorter distances it would be proportionately less. Of all vehicles observed, approximately twenty-five per cent were of the type that approached this extreme variation in tread width. Considering possible errors in measurement of tread width, an extreme variation of 15 to 20 feet at a distance of 200 feet would not vary the final results to any appreciable extent.

The vehicle from which the pictures were taken, the passed vehicle, was operated steadily at 35 miles per hour throughout the study. In no case was a passing vehicle considered, unless there were no other vehicles within approximately 1,000 feet preceding and following the vehicle in the passing movement.

To more accurately estimate the speed difference between the passing vehicle and the passed vehicle, the distance between the front axle of the two vehicles was used in each case. This distance divided by the corresponding time taken to complete each half of the passing movement gives the speed difference between the two vehicles for each half of the passing movement.

Figures 2 and 3 show the relative distances at which the passing vehicle began and ended the passing movement from the passed vehicle, and the corresponding speeds.

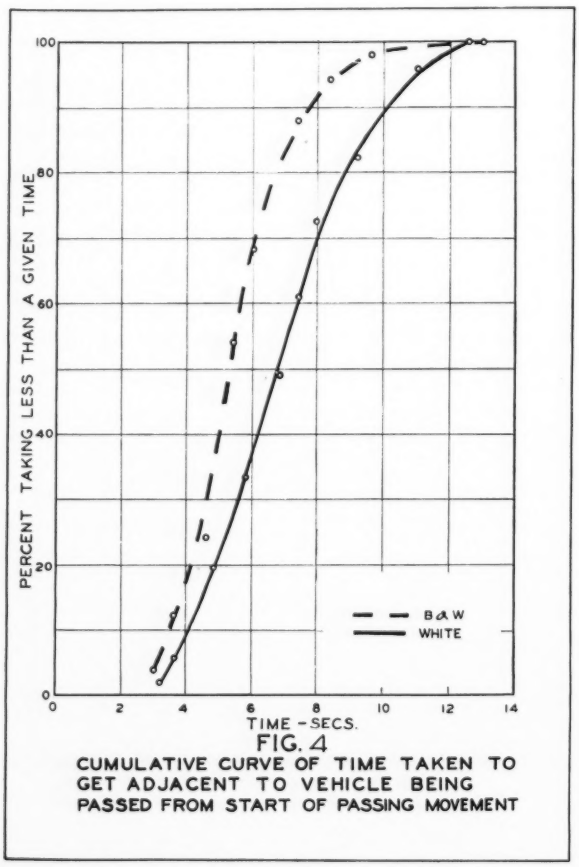


FIG. 4

CUMULATIVE CURVE OF TIME TAKEN TO GET ADJACENT TO VEHICLE BEING PASSED FROM START OF PASSING MOVEMENT

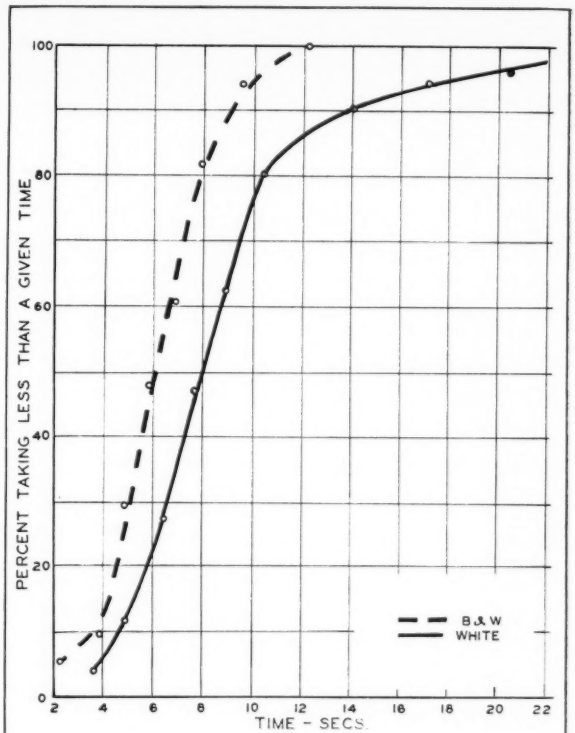


FIG. 5

CUMULATIVE CURVE OF TIME TAKEN TO COMPLETE PASSING MOVEMENT FROM A POSITION ADJACENT TO PASSED VEHICLE

Of the fifty vehicles observed on the black-and-white pavement, all but four completed the passing movement within approximately 200 feet of the passed vehicle. On the white pavement, five of the 56 vehicles observed never did return to the right lane while in sight, and 16 others were more than 200 feet from the passed vehicle when they returned to the right lane. Only the vehicles that properly completed the passing movement were used.

It is quite evident in both graphs that the passing movement was executed much more quickly on the black-and-white pavement. On both type pavements, the distance at which the vehicles began the passing movement varied almost directly as the speed. On the average though, it took two seconds longer for the passing vehicles to get adjacent to the vehicle being passed.

In Figure 3, there is no similarity between the two studies of the completion of the passing movements on each type pavement. On the black-and-white pavement the distance beyond the passed vehicle at which the passing vehicle returned to the righthand lane increased only slightly as the speed increased. On the white pavement this held true for speeds up to 50 miles per hour, but at higher speeds this distance increased greatly. This comparison definitely shows the influence of the darker and rougher pavement in causing the vehicles to return to the right-hand lane.

At the slower speeds, the passing vehicles linger upwards of ten seconds in the inside lane of the white pavement after passing the slower vehicle.

The cumulative curves of the time taken by drivers to complete each half of the passing movement in Figures 4 and 5, show to some extent just how much influence the black-and-white pavement has in controlling the passing movements.

In Figure 4 which shows the curve of the time taken during the first half of the passing movement, 50 per cent of the vehicles took between 4 and 6 seconds on the black-and-white pavement, and 92 per cent took less than 8 seconds to complete the passing movement. On the white pavement, only 28 per cent were in the 4 to 6 second range, and only 70 per cent took less than 8 seconds to complete the passing movement.

In Figure 5, the cumulative curve of the time taken to complete the second half of the passing movement, the effect which the black-and-white pavement had on the passing movement is still more apparent. On this pavement, all of the vehicles observed completed the second half of the passing movement in 12 seconds or less, and 81 per cent completed this movement in less than 8 seconds. On the white pavement, only 86 per cent of the vehicles completed the second half of the passing movement in less than 12 seconds and only 49 per cent completed this movement in less than 8 seconds.

Discussion of Results

In each of the three studies, some evidence was shown that the dark, rougher lane of the dual-type (black-and-white) pavement has some influence on the vehicle operator as he drives along the road. In the study of the lateral placement of vehicles, a very small percentage on the black-and-white roadway were out of the right lane except when passing another vehicle or about to make a left turn. On the all-concrete (white) pavement, better than 10 per cent of the vehicles were operating out of the right lane in an improper position on the roadway. The color and noise characteristic of the dark and rougher passing lane made it apparent to the drivers that the right lane was more comfortable and therefore more desirable in which to drive.

In the study of the location of the vehicles operating in the right lane the black-and-white pavement apparently influenced the driver to stay more in the center of the lane.

In the overtaking and passing study, there was a marked difference in the passing characteristics of vehicles on the two types of pavement. On the black-and-white pavement, the vehicles began the passing movement nearer the vehicle to be passed, and completed the passing movement nearer to the vehicle being passed than on the all-concrete pavement. On an average, vehicles took 4 seconds or 33% longer to complete the passing movement on the all-concrete roadway than they took on the black-and-white pavement. No vehicles stayed in the passing lane on the black-and-white pavement for a sustained length of time, although some did on the all-concrete pavement.

It is quite evident through these studies that the macadam lane of the black-and-white pavement has a definite effect on the operational characteristics of drivers. In the study of passing movements, the effect is shown by the fact that vehicles take less time to execute passing movements and tend to better execute the idea: *"Pass on the Left; Drive on the Right."*

MIAMI BEACH

(Continued from page 308)

direct benefit from these areas to make the parking spaces free to those who use their cars only to get to and from their work and who occupy all day a car space costing the taxpayer from $500 to $1,500.

"There is very little more justification for the taxpayer to furnish this convenience free, than there is for him to build a garage for the car owner at the car owner's private residence," Renshaw declared. "Nor should the taxpayer who derives no benefit from the project be called upon to provide off-street parking areas for a business section unless efficient use is first made of the parking space already available in the streets of the section."

Thus the city-owned and operated offstreet parking areas were chosen as the best solution for Miami Beach's problem. Revenue comes from the car owner using them, whether he be a year-'round resident and taxpayer, a casual visitor from some nearby city coming for a swim on the beach or a vacationer using hotel or apartment facilities at Miami Beach.

City Manager Renshaw stage-managed the entire parking program from its inception, encouraged its adoption by the city council, and reasoned successfully against merchant and taxpayer opposition which arose in the early years.

Such opposition, however, has long since disappeared, and in all quarters of civic and business life in the city there is approaching unanimity on the soundness of the parking program. It has accomplished wonders already in minimizing the community's traffic harassments. It has cost the taxpayers relatively little. And it has performed sensationally in facilitating the flow of customers through the city's shopping and business establishments.

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Reference Notes

Double-Face Traffic Sign

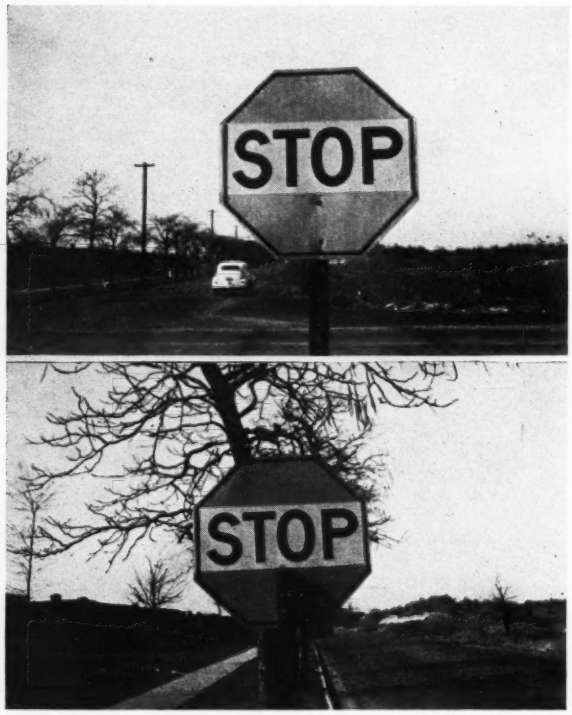
Charles J. Walker
Traffic Engineer
Gary, Indiana

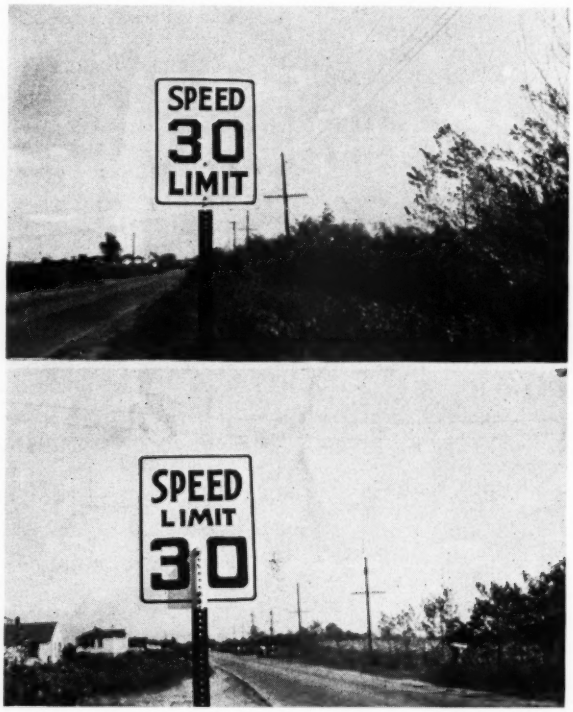
ACCOMPANYING photos show double-face traffic signs now in use at Gary, Indiana.

The object of this type of sign is to make use of the waste space on the back of the standard sign, while saving 50% of the cost of posts.

On the speed limit sign the lettering is changed to allow the post to be located between the numbers.

The top of the post is located slightly below the center of the sign and provides proper support.





New Tests Devised For The Drinking Driver

In an effort to present objective proof of the fact that one out of every five motorists involved in traffic accidents last year were definitely under the influence of alcohol, a new series of chemical tests have been devised which will help to reduce the number of deaths and injuries on the streets and highways of America.

"In the past, arresting drunk drivers was easy compared to the task of obtaining convictions," Thomas N. Boate, manager of the Association of Casualty and Surety Companies' public safety division, revealed recently.

"By the time the case was brought to court the defendant had sobered and 'proof' offered to establish his previous condition was ineffective. Eye witnesses gave conflicting reports and the so-called characteristic actions of an inebriated person are also characteristic of many other conditions. Clever lawyers all too frequently were able to obtain acquittals for persons who should have been found guilty."

However, Mr. Boate continued, chemical tests now provide scientific proof of not only whether a person has been drinking, but also indicate to what extent he is intoxicated. With such evidence, police officers and courts can be more certain of just convictions.

Special courses are being held in various universities throughout the country in which traffic officers are trained in the use of chemical tests. By using these tests properly, an officer who smells alcohol on the breath of a driver may collect a sample of the breath or body fluids and let the resultant chemical analysis be the positive proof of whether or not the driver was operating under the influence of alcohol.

"The knowledge that one may be subjected to such an examination at any time," the public safety specialist pointed out, "should have a strong psychological effect upon the driving public. They will think twice before driving their car after drinking. The average man can drink about two ounces of whiskey and be legally sober. Six to seven ounces, however, usually results in a concentration of alcohol in the blood of 0.15% and regardless of his actions and external appearance, he is legally considered to be 'under the influence'.

"A very definite correlation exists between the percentage of alcohol in the body, as indicated by these chemical tests, and the ability of the person to coordinate his faculties," Mr. Boate emphasized. "Those who maintain they see more clearly and drive more carefully after drinking simply do not know what they are talking about. It can not be emphasized too strongly that to drink and then drive is to flirt with death."

TRAFFIC NEWS

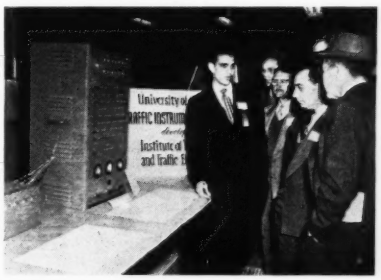
California Conferences Explore Street and Highway Problems

California's street and highway problems were subjected to all-out attack by more than 622 engineers and officials who participated this month in two conferences sponsored by the state's Institute of Transportation and Traffic Engineering, which operates within the University of California.

On January 30, a 3-day conference, popularly known as the annual "road school" drew 344 to the Los Angeles campus of the University. This was followed by a one-day conference on the design of urban arterials at the Berkeley campus, February 3, with 278 in attendance. Road school topics ranged from broad planning problems through details of administration to specific techniques in design, construction and maintenance.

Highlight of the design sessions was a preview of geometric designs for arterial highways, presented by Joseph A. Barnett, chief of the Urban Design Branch, U. S. Bureau of Public Roads, Washington, D. C. Barnett's material was selected from the design guide being prepared by the American Association of State Highway Officials.

Joseph E. Havenner, Manager, Public Safety Department, Automobile Club of Southern California, presiding at the traffic session of the Conference.



Robert Brenner of Institute of Transportation and Traffic Engineering staff, explains automatic traffic speed and volume counter developed by the Institute.

A strong case for one-way streets was documented by D. Jackson Faustman, Traffic Engineer for Sacramento, Calif. Faustman presented figures which showed that while business in Sacramento County dropped 1.3%, that on streets changed to one-way between the same periods rose more than 2.0%. In addition to the data on those directly affected, he reported surveys showed that where one-way streets were actually established they met with overwhelming public approval. As a clinching argument for Sacramento, studies show one-way streets can be extended for $23,000, yielding greater capacity and a lower accident rate than a street-widening program which would take over 2 years to complete and would cost $1,306,000.

Presiding at both the Los Angeles and Berkeley conferences was R. M. Gillis, Assistant State Highway Engineer, California Division of Highways. Among the nationally known road men appearing on the road school program were Norman Damon, Vice-President of the Automotive Safety Foundation, and R. H. Baldock, Oregon State Highway Engineer. Both spoke on long-range highway planning.

Some economic aspects of off-street parking were brought to light by M. H. Irvine, City Engineer of Riverside, Calif. Riverside has developed a thorough study and plan, but has found that to increase the capacity of its present municipally owned lots to 6,603 vehicles—the estimated 15-year minimum requirement—would take 50 years of parking meter revenues. Joint financing by municipal and business interests was regarded as the most practicable way to bridging the financial gap.

Delegates to the Los Angeles meeting wound up with a field trip covering points of interest within the extensive new street and highway developments now under way throughout the Los Angeles metropolitan area.

James E. Reading, Traffic Engineer, City of San Diego, California, speaking to traffic session on "Facilitating Traffic Movement by Signalization."

For An Engineer, What Are The Most Desirable Personal Characteristics

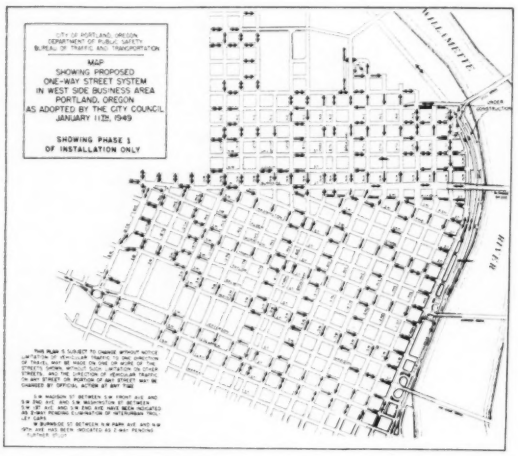
1. Intelligence; 2. Dependability; 3. Organizational acceptability; 4. Energy; 5. Emotional acceptability; 6. Physical acceptability.

In a survey by the Engineers' Council for Professional Development, 44 of the nation's top-level engineering executives listed the above six "most desirable personal characteristics" for a successful engineer. The questionnaire results were carefully analyzed and charted by an E.C.P.D. committee. This study is available from Engineers' Council for Professional Development, twenty-five cents each. Larger quantities for use in educational, company, personnel, society, etc., work are available at a discount.

The Registration Bulletin

Portland Inaugurates One-Way System

Fred Fowler, Traffic Engineer for Portland, Oregon, reports that on February 27, Portland put into operation the first phase of its one-way grid system in the downtown district. The area affected is approximately one square mile of the central business district and includes over 20 miles of one-way streets.



The original plan was submitted to the City Council in January, 1946. After three years of meetings, conferences and public hearings, the plan was adopted by the Council and $80,000 was made available in the 1949-1950 budget for installation of the grid system.

The date set originally for the installation was August 25, 1949. At the request of the Portland Traction Company, the date was postponed twice until they could secure equipment to replace the three remaining street-car lines.

In advance of the original installation date, the downtown streets were marked with lane lines and large arrows assigning two lanes to the direction coincident to the one-way movement and one lane to the opposing movement. The downtown signal system was retimed on a 50 second cycle with a progressive band in the direction of the future one-way movement. These steps and the excellent advance publicity given the grid plan by the newspapers and radio stations made the drivers very conscious of the proposed direction of travel and, as a result, the final changeover was made with very little confusion.

In addition to the normal one-way signs on the far left and right hand corners, and a special illuminated one-way arrow sign on the overhead span wire, a 3 foot "sawhorse" barricade with turn prohibition signs was placed at each intersection. It is planned to leave these in place for about three weeks. The police department assigned 128 officers to strategic intersections within the grid. These officers had very little trouble and on the third day were returned to their normal duties.

Nothing but favorable comment has been received, and aside from necessary changes in bus loading, no major changes appear to be necessary.

As soon as the traffic flow has stabilized, a series of "after" studies will be made and a detailed report on the results obtained will be published.

The orientation map above shows the layout of the one-way grid.

Northwest Traffic Engineering Conference

The Third Annual Northwest Traffic Engineering Conference has been scheduled for Thursday and Friday, June 1-2, at Oregon State College. The first in the series was held at State College in 1948. Last year's sessions were held at the University of Washington in Seattle. The Northwestern group plan to continue these conferences as an annual affair by rotating between the two colleges each year.

Sponsors for the conference this year, in addition to Oregon State College, are the Oregon State Highway Commission, League of Oregon Cities, Association of County Engineers of Oregon, The Institute of Transportation and Traffic Engineering, University of California, and The Western Section, ITE. Members of the Western Section are assisting in preparation of the program. Dean Gleeson and Professor Coopey of the School of Engineering at Oregon State College are handling local arrangements and publicity.

The first day's program will be devoted to the subject of public relations, and will be highlighted by a luncheon address on "Public Relations and the Traffic Plan" by Mayor Dorothy McCullough Lee of Portland. Various aspects of public relations applying to state, county, and city traffic problems will be aired in a panel discussion during the afternoon. The Friday morning session will feature an approach to coordinated traffic control, and will be directed toward effective coordination between engineers, transit groups, enforcement and the courts. The problem of parking will come in for a round-table discussion in the early afternoon, and the formal sessions will close with another panel discussion on the practical application of traffic studies.

The entire program is directed primarily to the smaller cities in the northwest area. Selected speakers will include federal, state, county and municipal officials, as well as representatives from the radio, the press and commercial interests.

Cataphote's Catalogue No. 50

A new catalogue has been completed by the Cataphote Corporation of Toledo, Ohio, giving information on their line of traffic signs, street name signs, danger beacons and reflector buttons.

Also included in Catalogue No. 50 is a complete listing of traffic signs as designated and specified in the Bureau of Public Road's "Manual on Uniform Traffic Control Devices for Streets and Highways."

Further information may be obtained by writing direct to the Cataphote Corporation.

IMSA Convention Spotlights Traffic

The 55th Annual Convention of the International Municipal Signal Association will be held at Hotel Commodore, New York City, September 18-19-20-21. Men in this field from all parts of the U. S. and Canada are expected to attend the four-day session. A considerable portion of the program will be devoted to Traffic Signals, Street and Highway Lighting, Safety Lighting, etc. Thursday, September 21, has been named as Traffic Signal Day with the day devoted to discussion of both technical and practical problems in connection with the installation and maintenance of traffic signals and controllers.

Leading manufacturers of traffic signals, street lighting equipment, lamps, etc. will have displays at Hotel Commodore during the Convention.

An elaborate Recreation Program is being arranged for both men and ladies. There will be social affairs each evening for all and two special luncheons at the hotel for the ladies. The Annual I.M.S.A. Banquet will be on Wednesday evening, September 20th.

A cordial invitation is extended to all members of the *Institute of Traffic Engineers* to attend and participate in this Convention.

Effect of Heavy Loads On Pavement To Be Studied

The Highway Research Board announced today that plans have been completed for a large-scale test of concrete pavement under concentrated truck traffic using single axle loading of 18,000 and 22,400 pounds per axle and corresponding tandem axle loadings of 32,000 and 44,800 pounds. The relative effects of different axle loads will be tested on parallel lanes of the concrete test road. The trucks will operate at an average frequency of one truck per minute on a 24-hour per day, 7-day per week schedule.

This project has been arranged cooperatively by the states of Connecticut, Delaware, Illinois, Kentucky, Maryland, Michigan, Ohio, Pennsylvania, Virginia, and Wisconsin, and the Bureau of Public Roads, Department of Commerce. Several other states are expected to join the group. The project is to be administered and conducted by the Highway Research Board.

A 1.1-mile section of U. S. Route 301 in Southern Maryland has been set aside by the State Roads Commission of Maryland for these tests. Traffic ordinarily carried by this road will use an alternate parallel road during the test period. This consists of two 12-ft. lanes of mesh reinforced concrete pavement laid on a good granular subgrade. Each lane is 9-7-9 in. in cross section. It is recognized that the structural character of this road is probably better than that of the average concrete road built for similar traffic conditions. The road was paved in 1941 and has withstood normal traffic and seasonal weather changes for nine years with very little damage.

The 1.1-mile section of road will be divided into two sections. In one section, single rear axle trucks loaded to 18,000-lb. axle load will run back and forth over one lane and trucks loaded to 22,400-lb. axle load will run back and forth the same number of times in the parallel lane. The other half-mile section will be tested in the same way with trucks equipped with tandem axles loaded to 32,000-lb. in one lane and 44,800-lb. in the other. In addition to detailed observations of visible effects of the traffic on the pavement, measurements of surface elevations, stresses and deflections under loads, subgrade condition, and concrete quality will be made.

Concrete blocks which will be used to load the test vehicles are now being cast. Preliminary soil surveys, concrete core tests, and surveys of the present condition of the road have been started and the loading will soon follow.

The project which will be identified as Road Test One-MD is to be administered and supervised by the Highway Research Board through a project executive committee consisting of Mr. Fred Burggraf, Associate Director, Highway Research Board, Chairman;

GETTING RESULTS

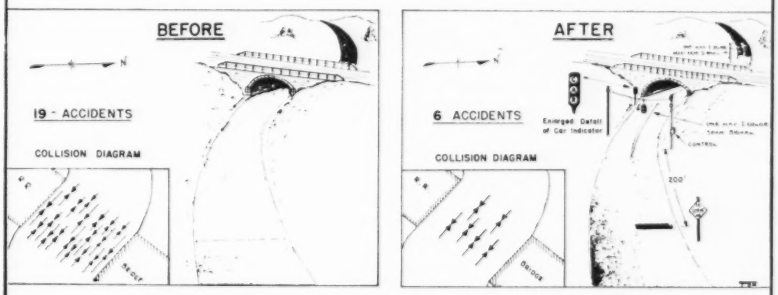
THROUGH TRAFFIC ENGINEERING

No. 9

TRAFFIC SITUATION No. 9

SAFEGUARDING AN UNDERPASS

PROBLEM—A railroad underpass on Route 40, Northeast, Maryland, formed the center portion of an "S" curve in the highway, blinding the view along both approaches. The head room varies from less than nine feet at the edge to 12 feet at the center of roadway. Route 40 is one of the main highways between Washington, D. C. and New York City.



ACCIDENT FACTS—Nineteen accidents in which 24 persons were injured and one killed occurred in 8½ months immediately prior to the traffic engineering improvements. The reported property damage cost for these accidents totalled $63,890. Most of the accidents resulted from head-on crashes. (See collision diagram). "Speed too fast for conditions" was a major cause of the accidents. Many of the head-on crashes occurred because commercial vehicles, due to insufficient overhead clearance at edge of roadway, would travel the center portion.

FIELD STUDIES—Route 40 carried a daily volume of well over 7000 vehicles, 20% of which were commercial vehicles. Traffic moved along the highway at comparatively high speed—too fast apparently to negotiate the "S" curve and underpass safely.

SOLUTION—Vehicle-actuated traffic signals were installed September 15, 1937, on the two approaches to underpass, to act as a speed control and car indicator system. The equipment consisted of a two lens unit (red and green) and a special "car" indication signal on each approach. (See sketch above). The signals normally show the red light. About 200 feet in advance of the signals, sound sensitive vehicle detectors were bedded into the right hand lane. Vehicles passing over these sound detectors actuate the signals. The signals are timed to change from red to green in accordance with the number of seconds it takes to travel from the detector to the signal at 15 mph. Drivers who obey the 15 mph sign, adjacent to detector, arrive at the signal just as it changes from red to green. Drivers exceeding 15 mph are forced to stop for a short interval before the green indication appears. Once a vehicle has passed over a detector the special "car" signal is displayed on the opposite side of underpass, informing motorists approaching from the other direction of the presence of the other vehicle.

CHECK BACK—Four personal injury and two property damage accidents occurred in twenty and one-half months after the speed control system was installed. The reported property damage loss was $1,520.

Example Contributed By

Marlin D. Brubaker, Director
Accident Prevention Bureau
Maryland State Police
Baltimore, Maryland

This is the seventh in a continuing series of selected "Getting Results" examples published by permission of the Accident Prevention Department, Association of Casualty & Surety Companies, 60 John Street, New York, N. Y.

Mr. Albert S. Gordon, Executive Assistant to Chairman, State Roads Commission of Maryland; Mr. T. J. Kauer, Director, Ohio Department of Highways, and Mr. H. S. Fairbank, Deputy Commissioner, Bureau of Public Roads, with the assistance of an advisory committee composed of representatives of the participating agencies. Mr. A. Taragin has been loaned to the Highway Research Board by the Bureau of Public Roads to act as Project Engineer.

Cars In 51 Per Cent Of Families

A survey by the Federal Reserve Board reports that 51 per cent of 50,400,000 American families own at least one automobile and that one out of 17 per cent own two or more. Car ownership was found to run ahead of home or farm ownership.

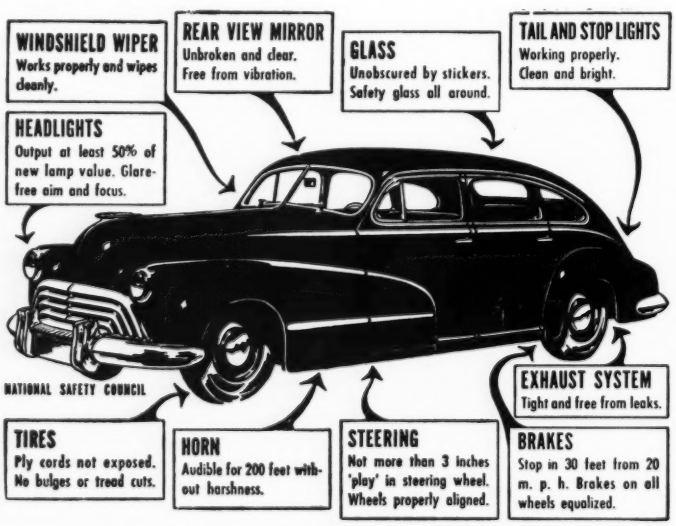
Operation Safety

Acting as the clearing house and chief dispenser of available information on the subject of vehicle maintenance is the National Safety Council's Operation Safety program—a project of public education which, during the past two years, has been adapted successfully by the majority of states and hundreds of communities to their own special traffic safety education uses.

Operation Safety, whose slogan during May is "Check Your Car . . . Check Accidents", will draw the public's attention to the fact that 13 per cent of fatal accidents in a year involved cars with some unsafe condition, according to National Safety Council reports for 1948—the last year for which complete figures are available. We can roughly estimate that this 1948 figure represents *at least* 4,000 deaths and untold painful injuries.

Fully as alarming as these figures, however, is the thought of the hundreds of thousands—perhaps even millions—of cars whose condition make them *potential* death traps. Investigating officials have estimated the number of cars with unsafe conditions at as high as one-third of all the cars on the road at any given time.

Probably the most comprehensive study ever made of car conditions was the nation-wide check of vehicles by the International Association of Chiefs of Police in 1946. This check found one out of three cars in need of some repair and substantiated the high estimates formerly made. Further substantiation is found in the experiences of traffic authorities in Memphis, Tenn., which has had compulsory vehicle inspection since 1934. Over the years since then it has been found that 31 per cent of the cars submitted for inspection must be rejected. Washington State, which has had state owned and operated inspection stations since 1937 found in 1947 that 71 per cent of the vehicles tested were in need of some sort of repair or correction. All of these are potential accidents—potential deaths and injuries.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Works properly and wipes cleanly.
REAR VIEW MIRROR
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GLASS
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TAIL AND STOP LIGHTS
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HEADLIGHTS
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Audible for 200 feet without harshness.
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Not more than 3 inches 'play' in steering wheel. Wheels properly aligned.
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Stop in 30 feet from 20 m. p. h. Brakes on all wheels equalized.

. . . AND ALWAYS IN GOOD CONDITION!

Check points for every driver who knows economy and safety—check points to be emphasized nationally to the motoring public during the National Safety Council's May "Check Your Car—Check Accidents" Operation Safety program.

Secretary's Column

Your Executive Secretary was afforded an opportunity recently to participate in a state-wide traffic engineering conference for the first time since the summer of 1948. We refer to the First Pennsylvania Traffic Engineering Conference originally reported on page 207 of the February issue. A group of thirty engineers and interested traffic officials from Pennsylvania, surrounding states, and Canada, attended the Conference.

Although the group was small, enthusiasm was not lacking and excellent discussions were held in the afternoon panel sessions. Many prominent traffic engineers from Pennsylvania, officials from the U. S. Bureau of Public Roads, the State Highway Department, the Pennsylvania Bureau of Municipalities, and instructors from the staff at State College, participated as guest speakers.

As reported in this column in the April issue, the Board of Direction at its last meeting deemed it necessary to withdraw from official and active participation in regional and state-wide conferences until such time as the resources of the Institute will permit. It is hoped that at some future date the ITE will be in a position to obtain additional staff personnel and provide a continuing service to states wishing to activate conferences of this nature.

It is the opinion of your Executive Secretary that state-wide "in-service" traffic engineering conferences are extremely desirable. We see no reason for a cessation of this activity due to the action taken by the Board of Direction. This action does not preclude Local Sections or individual membership participation. For example, the Western Section has actively sponsored the Northwest Traffic Engineering Conference for the past two years, in addition to highway traffic engineering conferences in California. The Midwest Section sponsored a traffic engineering conference for the State of Illinois last December. Individual members have supported conferences in other states in a similar manner to the recent conference in Pennsylvania.

We know of other states, particularly in the South and Southwest portions of the country, who are anxious to activate traffic engineering conferences but feel that it is necessary to obtain active support from national headquarters. Obviously, your Executive Secretary cannot devote his entire time to extensive

travel for this purpose. As reported previously in this column, it has been extremely difficult for us to arrange a visit to Local Sections. We therefore strongly urge members in states interested in activating an "in-service" training conference to go ahead, with the support of individual members in the area concerned. Certainly there is ample talent available in every geographical area of the country. National headquarters will continue to make every effort to assist and support these conferences in a technical advisory capacity.

Much work has yet to be done before the traffic engineering profession is fully recognized throughout the country. We now have traffic engineers in 35 states and 80 municipalities. There is much room for expansion! A state-wide traffic engineering "in-service" training conference, supported by the State University, the Highway Department, the League of Municipalities and ITE members would go a long way toward facilitating this expanded program.

Robert S. Holmes

SECTION NEWS

New York Metropolitan Section

The Metropolitan Section, ITE, held a meeting on March 30 at the Hob-Nob Restaurant in New York City. This meeting was held during the three-day session of the Greater New York Safety Council and was attended by well over forty people, including the Student Body and staff of the Yale Bureau of Highway Traffic.

President Ed Wetzel brought up a request he had received from the New York University, Center for Safety Education, that the Metropolitan Section, ITE, co-sponsor those portions of the short course they are planning that deal with traffic engineering. A question was brought up as to section and national policy in these matters and a committee was appointed headed by Merwyn Kraft to investigate this matter further.

The guest speaker at this meeting was Burt Marsh, who gave a very interesting and provocative talk concerning new activities. The first of Burt's four subjects concerned the proposed highway Research Board study in connection with various Highway Departments to ascertain the effect of various truck loadings on different types of pavement surfaces and sub-grades. The first of these proposed tests would subject a stretch of existing highway to the equivalent of forty years of use in a six month period and by varying the loading of the trucks making the test, the effect of such loads will be determined.

The second two subjects, Burt labeled as cases of "Man Bites Dog". The first of these was an indication of the fact that controlled intersections are more hazardous than those which are not controlled. Using a ratio of a number of accidents at a series of controlled intersections compared to the number of accidents at a series of un-controlled intersections, it was found that the higher the level of control, the more hazardous.

The second "Man Bites Dog" case was the fact that in many places it has been shown that higher speeds in speed zones produce better results than lower speeds. It was found in certain tests that raising the speed limit increased the average speed, and reduced the number of vehicles exceeding the 85 percentile speed and also reduced the number of vehicles travelling at excessively low speeds, thus bringing a much larger percentage of vehicles into the 10 miles-an-hour pace. At this point, Burt stated that we, as Traffic Engineers, must determine what is to be done on a factual basis and stick to such a decision unwaveringly.

The last subject Burt discussed was along the lines that a very dangerous trend in urban development is the planning of radial highways with little or no emphasis on circumferential or belt roadways and with little or no attention to terminal facilities at the center of these systems. This last subject provoked a great deal of discussion among the members present, especially since some of them are engaged in this type of work at present.

President Wetzel closed the meeting with a word regarding the fact that plans for the 21st Annual Meeting of the ITE are progressing rapidly and all committee chairmen are busy with their respective plans.

Reported by Stanley T. Siegel
Associate Editor

Michigan Section

The Michigan Section of the Institute of Traffic Engineers held a dinner meeting in Detroit on March 7, 1950. An excellent steak dinner with all the trimmings was prepared by Chef Fred Meno, who was ably assisted by Al Hanson and Sven Kansman.

Robert J. Lauer, in charge of Pontiac styling for the General Motors Corporation, showed movies about this phase of car manufacture and lead an interesting discussion session after the films.

A. F. Malo and Carl McMonagle discussed plans for the coming State Safety Conference and the desirability of replacing this with a Governor's Highway Conference at a later date.

The annual business meeting of the Section, in which new officers were elected, was held in April and will be reported in the next issue.

Arthur C. Gibson,
Secretary

University of Illinois Student Chapter

The main project of the Chapter for the spring term was the preparation of an exhibit for the 1950 Engineering Open House. Each student chapter of the various engineering societies prepared a special exhibit for public display March 31st and April 1st. Our exhibit included several types of highway signs, traffic counters, radar speed meters, driver test equipment and parking meters. The Electrical Engineers were awarded first prize and we placed second among the 20 different exhibits shown. Naturally we are quite proud of this accomplishment in view of the fact that we represent the smallest engineering society at the University.

Edward A. Brooks
Secretary-Treasurer

LOOKING AHEAD

JUNE 1 & 2, 1950—CORVALLIS, OREGON
Third Annual Northwest Traffic Engineering Conference. Oregon State College. Contact Martin Coopey, Associate Professor of Highway Engineering.

JUNE 18-21, 1950—BOISE, IDAHO
Western Safety Conference. Contact L. M. McKay, Vice-President, Western Safety Conference, P. O. Box 1038, Boise, Idaho.

AUGUST 21-24, 1950—PASADENA, CALIFORNIA
National Technical Conference. Illuminating Engineering Society. Hotel Huntington.

SEPTEMBER 18-21, 1950—NEW YORK, N. Y.
Fifty-fifth Annual Convention. International Municipal Signal Association, Inc., Hotel Commodore.

SEPTEMBER 24-27, 1950—NEW YORK, N. Y.
Annual Meeting. Institute of Traffic Engineers. Hotel Commodore.

SEPTEMBER 25-27, 1950—LOS ANGELES, CALIFORNIA
American Transit Association. Biltmore Hotel.

OCTOBER 7-12, 1950—COLORADO SPRINGS, COLORADO
Fifty-seventh Annual Conference of the International Association of Chiefs of Police, Antlers Hotel.

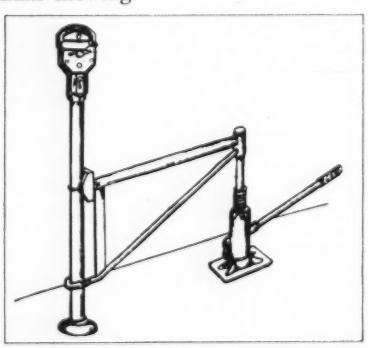
OCTOBER 9, 10 & 11, 1950—CHICAGO, ILLINOIS
Annual Meeting. National Council of State Boards of Engineering Examiners. Congress Hotel.

OCTOBER 15-18, 1950—NEW YORK, N. Y.
American Public Works Association. Hotel New Yorker.

OCTOBER 16-20, 1950—CHICAGO, ILLINOIS
Thirty-eighth National Safety Congress and Exposition. National Safety Council.

Mi-Co Pipe Straightener

The lower hook section of the Mi-Co pipe straightener is placed slightly below the bend in the pipe and the head section is then clamped tightly to the post with a U bolt. The 5-ton jack is then placed at the far end of the jack and by raising up it brings the post back to a straight line with no visible kinks showing.



Mi-Co pipe straightener. Over-all dimensions 32" x 19¼". Total weight including 5 ton jack—45 lbs.

The head section which clamps around the post has been designed in such a manner that on the removal of one bolt it can be turned a quarter turn and the inverted V section then can be used on straightening out an inside bend on an angle iron post such as is used for street signs. For further information write: Mi-Co Meters, 241 Court St., Covington, Ky.

'Parking Passes' For Sale

The City of Martinsburg, West Virginia, is experimenting with a "parking pass"—for $36 a year motorists can buy a sign for their windshield which allows them to stop at parking meters without putting money in.

Personalities . . .

NED H. DEARBORN readily confesses that he is not a traffic engineer. But he is a human engineer, and he can untangle emotional and mental snarls as effectively and skillfully as any member of ITE can handle traffic problems. So it is entirely appropriate that *Traffic Engineering* should ask him for a personality sketch.

Ned is a reconstructed farm boy, but not too much reconstructed. He was born and brought up on a farm in Pennsylvania and still goes back there every chance he gets. It's dollars to doughnuts he goes there to live when he has conquered accidents and decides to retire.

Ned Dearborn—he was Dr. Dearborn then—came to the National Safety Council in 1942 as its executive vice-president, and two years later became its president. He came to the Council from New York University, where he was dean of the Division of General Education and supervised the university's Center for Safety Education. That was on a July day in 1942—about 11 A.M. At 11:02 A.M. he started talking cooperation to the staff, and hasn't stopped talking about it yet. He is thoroughly convinced that safety is a job no one organization and no one individual can accomplish, but that it is everybody's business. He has made a united attack on accidents, a major goal in his regime as head of the National Safety Council, and he has made long strides in that direction.

At 11:30 that same July morning Dr. Dearborn, in a simple ceremony, defrocked himself of his cap and gown and became Ned Dearborn to everyone who was to know him henceforth.

Like a pitcher with a "blooper" ball,

(See DEARBORN, *page 326)*

TRACY DEAVIN LEMAY, age 65, height 5′ 11″, weight 155, is a lean Cassius who says he is still sound in wind and limb in spite of his vices. He was born at Tudeley-Cum-Capel in the County of Kent, England, in 1884. His father and most of his relatives were mixed up in the "hop" business which is perhaps a good excuse for the

life he has lead.

After being furnished with a classical education at Tonbridge School, of which he did not take full advantage, it was decided for him that his future lay in the real estate business and so he became an office boy in an office in the west end of London and was required to wear a plug hat and tail coat, as was the custom in the best circles in those dark days. As a result of being fired for incompetence, and other good reasons, three or four times during the next five years, and after having qualified as a fellow of the Surveyors' Institution (F.S.I.), he decided that his forte lay in the wide open spaces and in 1906 landed in Toronto, Canada, which at that time had a population of 250,000 (it is now about 700,000).

He apprenticed himself for two years to a land surveyor and after passing the prescribed examinations by the skin of his teeth, received his commission as an Ontario Land Surveyor (O.L.S.). In 1910, having been appointed City Surveyor for the City at what looked like a sufficient salary, but wasn't, he married Florence Muriel Freday Pagett-Mayne of Torquay in the County of Devon. They have three daughters, two sons and six grandchildren. As Surveyor to the Corporation he naturally became involved in planning matters and in 1930 was appointed City Planning Commissioner and soon after, City Traffic Engineer.

He now has three jobs but, he insists,

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If one red lamp burns out, the other carries on, and thus provides a positive STOP indication until the burnt-out lamp is replaced.

The "Double Red" also gives double visibility, thus providing greater safety.

The "Double Red" Signal operates from standard controllers and does not require any extra circuits.

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only one salary. Among his side lines are Director and Secretary-Treasurer of the Toronto City Planning Board, Director and Secretary of the Toronto and York Planning Board, Chairman of the Council of Management and of the Board of Examiners of the Association of Ontario Land Surveyors, President of the Institute of Professional Town Planners, American Society of Planning Officials, American Institute of Planners, Registered Professional Engineer, Director of the Toronto Anglers' and Hunters' Association (3000 members) and Secretary-Treasurer of the Canadian National Sportsman's Show (the greatest show of its kind on earth).

The most important development during his term of office of City Traffic Engineer has been the unification of all engineering services relating to traffic in the Traffic Engineering Division of the Department of City Planning and Surveying. These services, includng signs, signals, pavement marking, street lighting, street name signs, channelization, etc. were previously handled by several departments. The Departmental Budget for this year is $763,200 and the happy association of Planning and Traffic in the one department is now beginning to pay dividends in improved highway efficiency but, like many other places, increased automobile registration has the whip hand.

He admits to two major hobbies, one is loading the traffic work onto Bob Burton, his very capable "working" engineer and member of the Institute, and the other is fishing. He says he could show a picture of a bigger bass than Bob Shattuck's in the November issue, or was it a carp?, but refrains from doing so because it might encourage the sin of untruthfulness in an otherwise blameless (?) group of citizens. His other hobbies are that he doesn't play Canasta and thinks golf is work.

DEARBORN

(Continued from page 324)

Ned Dearborn's pace is deceptive. He has retained an appearance of academic leisure that gives the illusion he is just ambling through life. This is incorrect. He is a powerhouse at work and covers more ground than a traveling salesman—which, in fact is what he is as the nation's top safety crusader. He goes from city to city, from coast to coast, always and eternally working to make things safer. And along with all this he administers the affairs of the Council in an affable, effective manner.

In addition to his duties as head of the Council, he is a member of the coordinating committee of the President's Highway Safety Conference, the President's Conference on Fire Prevention and the President's Industrial Safety Conference.

When Ned was quizzed for background material about himself so a personality sketch could be written about him for *Traffic Engineering,* he made one statement that needs correction.

It was in connection with his hobbies. He listed such things as polo, football, wrestling, golf and other sports. (Not participating, but spectating.)

Now this is incorrect. For while it is true that Ned Dearborn is an ubiquitous sports fan, popping up at any and all kinds of athletic events from coast to coast in his travels, it is also true that his chief and constant hobby is people.

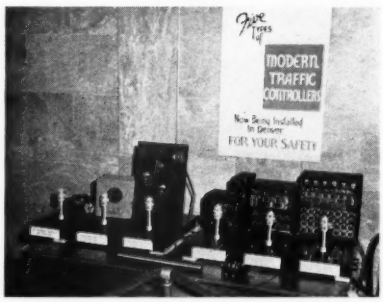
It is amazing how he is never too busy to stop whatever he is doing and meet a new friend or chat with an old one. It stands to reason that he is busy and that he has a lot on his mind. But you'd never know it to see him talking in a leisurely way with business associates, members of his staff, casual acquaintances—anyone who happens to be with him.

Ned Dearborn must be a trying person to anyone who believes in executive detachment. For he seems to lean toward cordial friendships with taxicab drivers, Pullman porters, newsboys and elevator operators. The colored doorman of a big apartment house on Riverside Drive in New York City was a buddy of Ned's for many, many years and unqualifiedly nominated his pal, at that time a dean at New York University for presidency of the United States or any higher job if one was invented.

Of course, a man like this is imposed on by his friends. They go to him with their troubles, even their little troubles. But they leave him feeling a lot better. And Ned seems not to mind. In fact, he enjoys it. He's even happier when someone barges in to tell him about a minor triumph—a new tooth for the baby or a home run by the boy in college.

His family consists of his wife, Glennie, a daughter-in-law, Mrs. Gayle Dearborn, and a six-year-old grandson who can spot his granddad 100 yards and still beat him down the hill or anywhere else.

And here's a tip—if you ever run into him, no matter where or when, and you have any slight desire to go to bed that night, don't mention *safety.* You'll end up sleepless and a member of a safety committee!



Henry A. Barnes, Traffic Engineer of Denver, Colorado, furnished the above photograph of a public display set up in the main lobby of the City and County Building in Denver. Hank reports that the display attracted a great deal of attention from several thousand Denver people because they were able to see the little lights change and could push the buttons and make the actuated equipment operate.

Position Available

CITY OF HAMILTON, OHIO. The City of Hamilton is seriously contemplating the employ of a traffic engineer—possibly on a full-time basis, and possibly for a combination arrangement whereby such an individual would spend the majority of his time on traffic engineering and the balance on planning work. The City is mainly interested in the traffic angle and is anxious to secure applications and interviews with qualified persons.

Inquiries should be directed to the City Manager, Hamilton, Ohio.

Position Wanted

JUNIOR TRAFFIC ENGINEER. Student Chapter, ASCE, Oklahoma A&M. 21 years of age. Single. Above average grades. Advanced study in highway engineering and economics. Summer work in highway department; part-time employment in highway research laboratory, Oklahoma A&M. Available upon graduation in C. E. on or about June 1, 1950. Inquire through TRAFFIC ENGINEERING, Strathcona Hall, New Haven 11, Conn.

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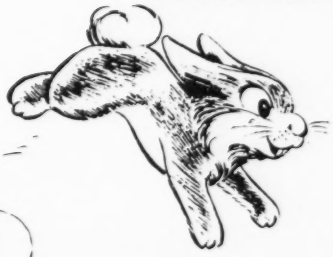

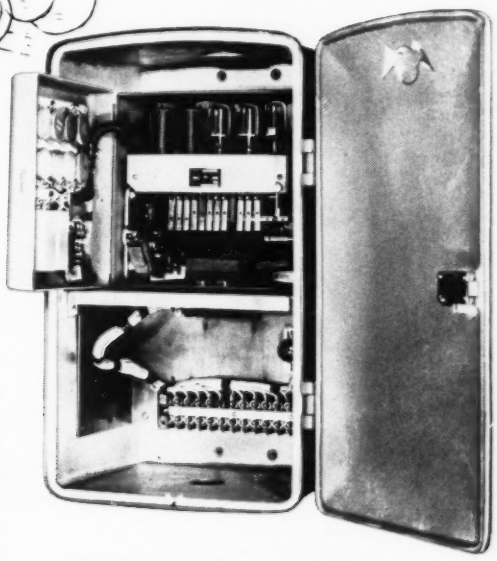

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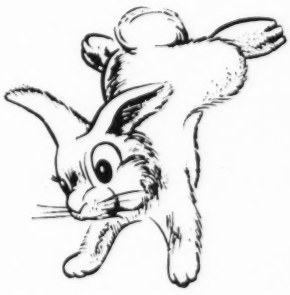

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Yearbook Changes

These changes have been published in a desirable place in the magazine so that they can be clipped and pasted in the appropriate pages provided in the Yearbook.

BALDWIN, DAVID M. (Assoc.)
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Washington, D. C.

VANDERSTEMPEL, THEODORE W. (Member)
DeLeuw, Cather & Company
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Assistant to President
National Safety Council
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Chicago 11, Illinois. WHitehall 4-4800

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Chief. Bur. Traff. & Safety Research
N. J. State Highway Dept. Tr. 2-2131
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R. D. #5, Trenton, New Jersey

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Dept. of Traffic Engineering
City Hall
Los Angeles 12, California. Michigan 5211

THOIN, LIONEL J. (Assoc.)
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Traffic Engineering Department
City Hall, Room 1000
Los Angeles, California. Michigan 5211, Ext. 2731

WRAY, ROBERT M. (Assoc.)
Traffic Engineer
Kentucky Dept. of Highways. Wabash 4374
SEND MAIL: 4013 Winchester Avenue
Louisville 7, Kentucky

Transfers

LeCRAW, CHARLES S. JR.
Assoc. to Mem.

McDONALD, GUY D., Assoc. to Mem.

WILSON, BRYAN, Assoc. to Mem.

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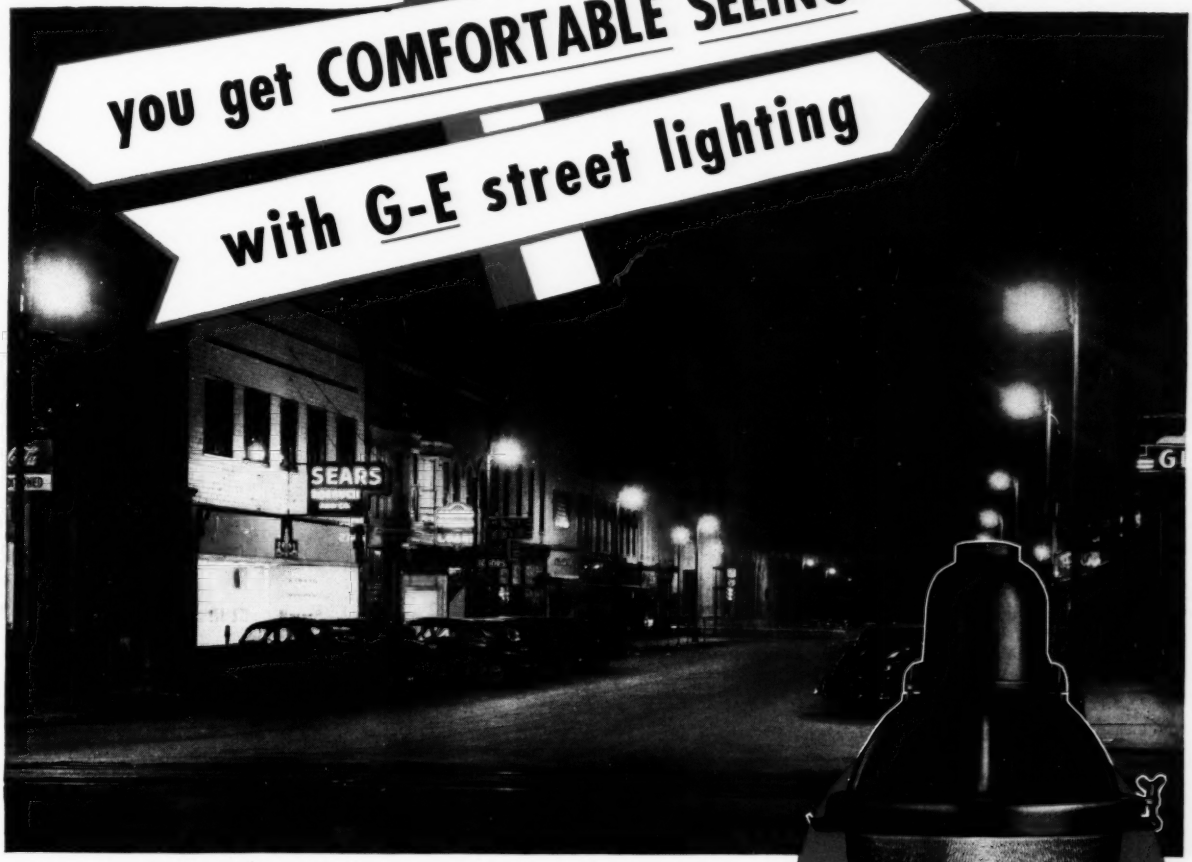
ORegon 9-4210

you get COMFORTABLE SEEING* with G-E street lighting



*Comfortable Seeing—the light you need, exactly where you need it, economically

Here's Seymour, Indiana, another town that has switched from dangerous darkness to leadership in light. City officials realized the inadequacy of their 20 year old lighting system, and that proper lighting would be a business attraction. With the help of their local utility, Seymour decided on a General Electric Comfortable Seeing installation for their business and residential areas.

Now the business streets are flooded with soft, eye-easing light—brightening the store fronts for shoppers—uniformly illuminating the street for the safety of both pedestrians and drivers.

The light on Seymour's residential streets is being more than doubled as old-style radial-wave reflectors are replaced by modern Suburban Reflectors. Photo-electric cells in the modern control circuit automatically turn lights on when they are needed.

TRADE FOLLOWS THE LIGHT

Business streets should be lighted in a manner which favorably influences and attracts night-time shoppers. Lighting and background are often just as important in motivating sales as the merchandise itself. This has long been recognized in connection with show windows and store interiors, but only in recent years are the psychological possibilities of exterior illumination being realized.

Plan on Comfortable Seeing when relighting your town. General Electric has the luminaire which will exactly meet the needs of your business districts, and residential areas. The lighting specialist in the nearest G-E Apparatus Department Sales Office can give you all the details. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

This is the Form 79AS an effective luminaire for main street lighting

It's a large-size ornamental unit with a circular light distribution (I.E.S. Type V). Has an Alzak† processed aluminum reflector, light-diffusing rippled globe, die-cast aluminum casing and hinged globe holder. Burns 4000 to 15,000-lumen series lamps, 300- to 860-watt multiple lamps.

†Manufactured under patents of the Aluminum Corporation of America.

GENERAL ELECTRIC

452-105

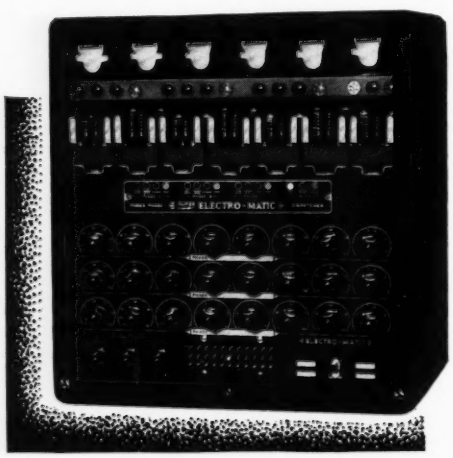
SUPER ELECTRO-MATIC

VOLUME-DENSITY CONTROL

For Most Efficient Handling of HIGH-VOLUME INTERSECTIONS

Volume density is the answer to your control problems at high volume intersections. A controller has to be "on its toes" to handle up to 50,000 cars daily. Volume density is doing this job from coast to coast.

Model 1022 SUPER ELECTRO-MATIC brings 2-phase control to its highest pitch of efficiency. Volumes are "counted-in" on both phases. Density of moving traffic is measured and waiting time evaluated. Vehicle and initial intervals are continuously adjusted for best over-all operation. Needless delay is entirely eliminated. Its "platoon-responsive" features facilitate progressions through a series of 1022-controlled intersections, without interconnection.



For the control of difficult high-volume intersections where traffic must be handled in 3 phases, the volume-density principle of the Model 1033 SUPER ELECTRO-MATIC is of utmost importance. Each phase is controlled with maximum efficiency at all times. Any phase having no traffic is omitted from the cycle. There are built-in provisions for signalling up to three overlaps where such movements may safely be allowed.

Send for literature on 1022 and 1033 SUPER ELECTRO-MATIC units.

Automatic Signal Division
EASTERN INDUSTRIES INCORPORATED

TRAFFIC ACTUATED

NORWALK, CONNECTICUT

In Canada, write to: Northern Electric Co., Ltd., Belleville, Ontario.

New Appointments . . .

WILLIAM R. MARSTON was recently appointed deputy city traffic engineer of Chicago by Lloyd M. Johnson, commissioner of streets and electricity.

He received a B.S. degree in railway electrical engineering from the University of Illinois in 1931, and upon graduation became associated with the Chicago Surface Lines as a student engineer.

After the training period, Marston worked under the staff engineer on all phases of mass transportation, including car and bus design, street traffic studies, parking studies, cost analysis, etc.

In April, 1942, he left on leave to enter the government service, as a business analyst with the Office of Price Administration, working on special research for the development of the rationing methods. He was later placed in charge of a newly-formed Transportation Unit of the Gasoline Rationing Branch.

After Navy duty as a lieutenant in command of an LCI (L), he returned to the Chicago Surface Lines in February, 1946, becoming traffic engineer with the organization, which was to become a part of the Chicago Transit Authority in October, 1947.

As traffic engineer with the CTA, he has coordinated CTA operations with street traffic, devised methods of reducing street traffic interferences, and carried on transit surveys and research.

He was secretary of the Western Society of Engineers Civic Committee from 1947 to 1949, was program chairman of the Traffic Engineering and City Planning section, 1948-49, and attendance chairman, 1949-50, for both the section and for WSE as a whole.

KERMIT B. RYKKEN was recently appointed to the position of Highway Specialist, Traffic Engineering and Safety Department, American Automobile Association.

Mr. Rykken brings with him a long experience in the highway planning field. He is a native of Willmar, Minnesota, and attended Teachers College, St. Cloud, Minnesota, and the University of Minnesota. From 1936 until the time of his appointment on March 10, 1950, he was associated with the Minnesota Department of Highways—for the past four years having been Director of the Division of Highway Planning of that Organization, with headquarters in St. Paul. He is an Associate Member of the Institute and a member of the American Society of Military Engineers. Having come from an area with no Local Section, Kermit expects to become active immediately with the Washington Section, ITE.

Engineers Are Tender Lovers

To a world of people filled with apprehension and fear in varying degrees there will be good news in an announcement from the Carnegie Institute of Technology. A survey there has disclosed that men of the engineering profession are solid citizens "not tormented by neuroses, tempted by secretaries or torn from the hearth at the slightest excuse."

They have the lowest divorce rate of any professional or vocational group and usually are logical, even tempered and good at fixing things around the house. In addition they were found to be religious and secure in their beliefs. Finally, the survey concludes, engineers are "tender lovers" who like large families.

The statements originated from Dr. James Bender, who is director of the National Institute for Human Relations. He made out such a case for the slide rule men that any girl looking over the field well might concentrate on the builders of bridges, railways and dams.

An old college song says "The engineers have hairy ears," but a girl could afford to overlook that in view of the exciting qualifications cited, both in Dr. Bender's statement and in the rest of that song.

Pay As You Drive

Coin meters now are going on instrument panels of used cars in some cities, reports a national magazine.

After making your down payment you must put a quarter in the slot before the ignition can be turned on. A warning buzzer sounds when another quarter is due. You have five miles in which to insert another coin, before the ignition switches off.

Six quarters a day for two years will pay off a $1000 balance on the car.

The photo below shows the students attending the First Pennsylvania Traffic Engineering Conference at State College, Pennsylvania. Guest speakers in the group include: Front row, left to right, H. G. Van Riper (Assoc. Mem., ITE); G. C. Davis, Urban Engineer, Bureau of Public Roads; William E. Cox, Chairman, Pennsylvania Highway Planning Commission; and far right, Joseph Intorre, Course Coordinator, Institute of Public Safety, Pennsylvania State College. Third row, left, Ray F. Riegelmeier, (Mem., ITE); and third from left, R. S. Holmes, Exec. Secy., ITE. Fifth row, far right, Prof. C. G. Reen, Department of Civil Engineering, State College.

Specify MIRO-FLEX STREET NAME ASSEMBLIES

YOU NEED THEM . . .

Every modern city needs good legible street markers. The Miro-Flex line is the finest of its kind. There is a style for every street marking need.

REASONABLY PRICED

You'll be surprised when you receive the Miro-Flex quotation on your street marking needs. Actually they cost less than many other signs. You take no chance with Miro-Flex.

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Letters are embossed on 18 ga. galvanized, bonderized steel. Baked enamel finish in contrasting colors. Tamper-proof mounting for poles or pipe. Will wear and look good for years.

WRITE FOR COMPLETE CATALOG
FULL DETAILS AND PRICES

PROMPT DELIVERY . . .

Miro-Flex has a good supply of standard traffic control signs and likewise deliver special orders of street name signs on short notice. When you think of signs, think of Miro-Flex.

MANUFACTURED BY

MIRO-FLEX CO., INC.

1824 EAST SECOND STREET · WICHITA, KANSAS

550

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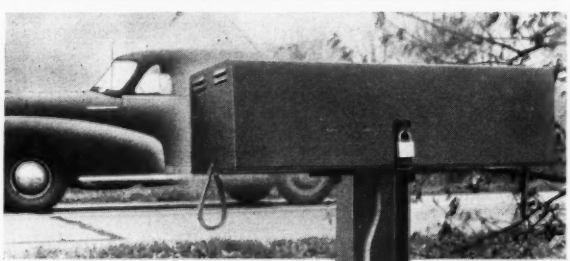
A DURABLE PLASTIC REPLACING PAINT ON PAVEMENTS

1. Widely used by leading cities for over 14 years.
2. Its use cuts marking costs by over 50 per cent.
3. Very high reflection and visibility.
4. Easy to apply. We train your own crews.
5. Installed with no interference with traffic.
6. Ideal for new and resurfaced pavements.
7. Available in desired sizes and colors.

NEW — An Industrial Marker — perfect for marking off-street parking lots and garages.

Let us supply you with full information.

ARMOR-FLEX COMPANY
St. Louis 22, Mo.



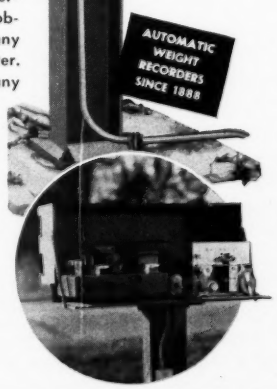
Here is the improved Permanent Station Traficounter — the latest in the line of Traficounters Streeter-Amet has developed over a period of many years. All highway departments who have relied on Streeter-Amet for help in their traffic problems will appreciate the many advantages of this new Traficounter. The detection is not affected by any weather — snow or ice. It is designed especially to eliminate rubber tubes or treadles. It detects vehicles at high or low density of traffic.

Write for information regarding this permanent Station Traficounter

Streeter-Amet Company
1726 BELLE PLAINE AVENUE
CHICAGO 13, ILLINOIS

NEW PERMANENT STATION TRAFICOUNTER

Below: Counter Open



"Traffic deaths at four intersections were reduced 71% in one year with modern lights"

says Mayor **Elmer E. Robinson**
San Francisco, California

"THE year prior to our installation of new lighting at four suburban intersections, there were 32 night deaths. The year following there were 19, a high rate but not caused by inadequate lights. The people of San Francisco are growing more aware of the great importance of street lighting. Our lighting program today is at an all-time high."

FOR MORE FACTS... *Write for your free copy of "Planned Progress in Street Lighting".*

The Street and Traffic Safety Lighting Bureau, 155 East 44th St., New York 17, N. Y.

for years of

Effective Service

Grote STREET NAME SIGNS

Easy to see and to read in split seconds —at any speed or in heavy traffic — these attractive Grote Street Name Plates are designed and built for finest appearance and dependable, long-wear service. The design and letters are sharply embossed so the message is permanently visible in form and color. The sign and all metal parts are either non-ferrous metal or heavily rust-proofed to stand for many years as a reflection of the civic pride of the community.

Grote Street Name Markers are capable guides that expedite local deliveries, effectively direct traffic, enhance property values — and they establish public confidence in the intent and accomplishments of the administration.

Known for sturdy construction, high visibility, economy of installation and maintenance, GROTE signs will not chip or flake — they give long years of effective service.

For economy — and safety's sake — GROTE SIGNS.

THE Grote MANUFACTURING CO., INC.
Established 1901

BELLEVUE, KENTUCKY
Opposite Cincinnati

ING